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Engineering News-Record

When Business Improves

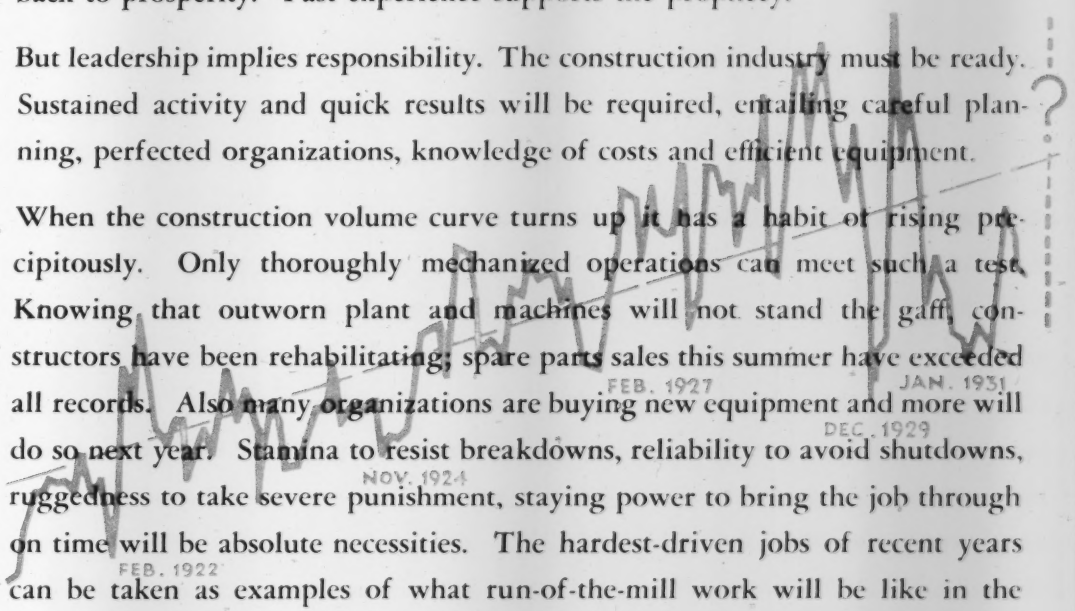
"The contractor who provides equipment haphazardly faces an unpleasant experience as construction swings into a new era of progress"

—*From an editorial in Engineering News-Record of July 2*

Construction activity is being heralded as the means for leading the world back to prosperity. Past experience supports the prophecy.

But leadership implies responsibility. The construction industry must be ready. Sustained activity and quick results will be required, entailing careful planning, perfected organizations, knowledge of costs and efficient equipment.

When the construction volume curve turns up it has a habit of rising precipitously. Only thoroughly mechanized operations can meet such a test. Knowing that outworn plant and machines will not stand the gaff, constructors have been rehabilitating; spare parts sales this summer have exceeded all records. Also many organizations are buying new equipment and more will do so next year. Stamina to resist breakdowns, reliability to avoid shutdowns, ruggedness to take severe punishment, staying power to bring the job through on time will be absolute necessities. The hardest-driven jobs of recent years can be taken as examples of what run-of-the-mill work will be like in the period immediately ahead.



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July 30, 1931

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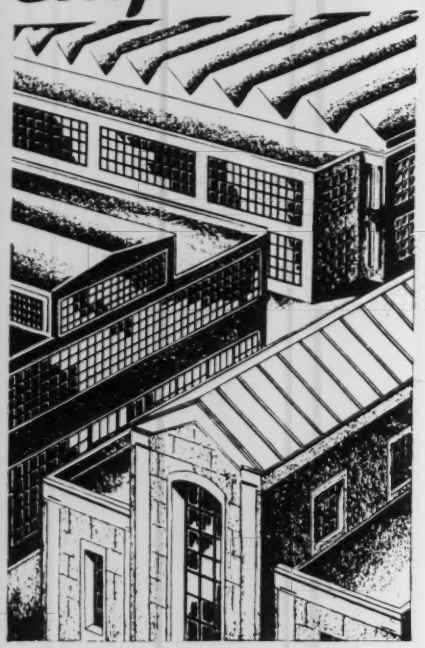

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ENGINEERING NEWS-RECORD

A WEEKLY JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION PRACTICE

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✦

Better Housing

FINANCIAL, industrial and technical problems all are involved in the difficult struggle to better the status of housebuilding, a field of activity well known to be much in need of modernization. Technical progress is somewhat faster than that in financial and industrial directions, but it still has far to go, and only few men are working on it. Another effort to build better houses by a new method is described this week. Its feature is the production of a concrete-wall structure by filling a wall frame of precast studs in such manner as to give an insulation space between body of wall and inner surface. In its effect the method is comparable to the brick hollow-wall construction developed some years ago. The success of any such method will ultimately depend upon the cost factor, for under the present financial and industrial systems governing dwelling-house construction the unsubstantial and rapidly deteriorating house has the advantage. Speculative developers can dress it up to compare favorably in appearance with a well-built structure; and its low cost is a telling sales appeal. When better financial control and more effective industrial systems are applied to housebuilding, a proper premium will be placed on lasting value and reduced upkeep. After such reform, substantial building will have a stronger claim on the market than can now be expected.

Conservation in Panama

THE water supply of the Panama Canal is to be increased through the construction of a large reservoir at the headwaters of the Chagres River. Primarily this new supply is to provide water for an increase in the possible number of lockages during periods of deficient river flow, but for the present it will be used for the secondary purposes involved in the comprehensive plan for the use of the resources of the Canal Zone. It will provide more water for generating power and for maintaining a uniform depth in Gatun Lake, and will minimize the trouble and delay due to floods. There is ample water available not only for all the present canal traffic but also for the prospective traffic of some time to come, but there is a deficiency of waterpower during four months of the year. So much power is required at the canal that during the eight months when water is available as much water is drawn from Gatun Lake for power as is used for the locks. During the four months when there is a deficiency of water for both purposes power has to be provided by the operation of a diesel-electric plant. Even so, the draft on Gatun Lake reduces the depth of water through Gaillard Cut to a point where the channel is close to the minimum requirements for large vessels. The new reservoir will, for the present, provide water for hydro-electric power development during the four months of deficient flow, will equalize the level of Gatun Lake, thus minimizing the risk to traffic, will reduce the amount of crossfilling of locks now required to conserve water, and in time of flood will provide a large area for flood storage. Before the total traffic exceeds the capacity of the present twin sets of locks, there will come a time when traffic will be delayed by occasional daily peaks of traffic in excess of the capacity of the present locks. As that time approaches, construction of a third set of locks is planned. More water will be required for those locks. The reservoir now to be built is to meet that need as part of a long-range planning program for the canal. Its construction now will reduce current operating costs through the conservation of water at present wasted.

Another Canal?

CONSTRUCTION of a canal across Nicaragua to supplement the Panama Canal is feasible from an engineering point of view, according to a statement made by Lieut. Col. Daniel I. Sultan upon his return to Washington. Colonel Sultan has been in charge of the resurvey of the Nicaragua canal route authorized by Congress two years ago and now complete. Despite its feasibility from an engineering point of view Colonel Sultan sees little need for the canal from a commercial point of view. His views as to the absence of any need for a second canal are amply supported by the statistics as to the capacity of the Panama Canal in the article in this issue describing the projected Madden reservoir at Panama. The present minimum capacity of the canal is 32 lockages a day. The highest average reached to date was 16.7 in 1928, little more than half the present capacity. With a third set of locks and the additional water supply from Madden reservoir the daily average can be increased to 60, sufficient for many years to come. If the government can find the $750,000,000 required to build a canal across Nicaragua it should be spent nearer home in a more productive enterprise.

Misleading Information

WAGE rates in the building industry continue their steady upward trend begun in 1922 despite the present depression, according to an announcement by the National Industrial Conference Board sent broadcast throughout the country. This statement is misleading. The board's findings are based on a tabulation of *wage scales* set by the various trades of the building industry and take no account of actual *wages paid*. This consideration is indicated in the explanatory statement which accompanied the board's opening announcement, but the explanation does not offset the false impression created by the original statement. Actual wages paid to laborers and mechanics in the building industry vary widely from

the wage scales set up by the labor organizations. Everyone familiar with the construction industry is fully acquainted with this fact. An average of actual wages paid in more than 50 cities shows that in most instances the actual wages paid mechanics are about 20 per cent below the scale rate and the wages paid common labor are down at least 25 per cent below the scale rate. In view of these facts a statement such as that of the National Industrial Conference Board serves only to mislead the public into believing that the construction industry has not adjusted itself to the present depression.

Steady Climbing

CONTRACTS have been let for the first part of the Pennsylvania Railroad's extensive improvement program at Baltimore. The work is going ahead despite a falling off in railroad business because it is part of a much more comprehensive program covering all the main lines of the Pennsylvania from New York to Washington designed to put the system in a position to handle more traffic in the future and handle it more economically. The depression has made it possible to do the work at less cost than was originally estimated, both in dollars and in time lost due to interference with traffic. It is a good example of the advantage of long-range planning. Such planning takes no cognizance of periods of depression except as a time in which to speed up construction, as was done in this instance. Long-range planning cuts through the peaks of prosperity and fills across the valleys of adversity. Like the grading for a mountain railway line, it converts irregular ups and downs into a uniform upgrade.

Roadbuilding

DESPITE the greatest federal appropriation ever made for public roads, highway expenditures in 1931 will exceed those of 1930 by only a scant fifteen million dollars. Local road administrations in 35 states spent enough less for road improvement to offset all but $14,943,108 of the increase in federal and state expenditures. These figures, collected by the Bureau of Public Roads, are confirmed in general terms by estimates based on a separate survey made by the American Road Builders' Association. Indeed every source of information makes it clear that local highway administrations have failed nearly universally to meet the request and follow the example of the national government by maintaining and increasing their activity in road improvement to relieve unemployment. State authorities generally have cooperated in expanding their highway construction, but nine states failed to do so, and instead decreased their road expenditures by nearly $73,000,000. All told, state road expenditures were increased $93,000,000 through state action supplemented by increased federal aid; yet the net increase in road expenditures in 1931 will be less than fifteen millions. Obviously, the road-building industries owe largely to federal aid whatever activity and prosperity they are enjoying. But, due to legal restrictions on kind of use, federal aid cannot compensate for decrease in local road expenditures. These latter spread employment and the market for equipment and materials to more people than do equal sums for main road construction, and their curtailment is more widely felt. It follows that those who seek to make highway work more effective in relieving unemployment should direct their efforts at the town and county boards that control local road operations.

Fifty Years Change

IN DAYS when railways are so harassed by road and waterway competition that they fear for their own ability to survive, a breeze of pioneer atmosphere issues from stories of the young days, when railways were being pushed on through plain and desert to the Pacific. Ralph Budd's brief account of the opening of the Pacific Northwest carries one back to that time. Before the railways reached the Coast, water transport around the Horn and wagon freighting over the mountains were the only means of communication. The railroads, with hardy courage, undertook to outdo water and road carriage, confident that they could render a service of surpassingly better kind. And they did. Through their transportation facilities they made possible the growth of a unified country over vast regions and forbidding barriers. We commonly forget that service today.

The long history that lies between the pioneer days and the present, substantially half a century, is replete with change of conditions and methods of railroad service. The change has come to a climax now as the Interstate Commerce Commission listens to the railroads' plea for increased rates to stave off bankruptcy for many of them and as the railroads seek to have their unregulated competitors, the bus and truck lines and coastwise ship lines, subjected to the same restrictions that limit their competitive movements.

The problems at issue must be solved, for railroad transporation is vital to our existence. Their solution no longer lies wholly in the hands of the railroad managers, as it did in those earlier days; much of railroad control has passed to regulatory bodies like the Interstate Commerce Commission. Nevertheless there still is ample opportunity for gain through boldness and individual initiative. It may not come through the spectacular pushing of a new line into an undeveloped wilderness or through the piercing of mountain passes to reach new sources of traffic; but renewed vigor will come to our railroad systems through the efforts of managers who are willing to slough off outworn practices and facilities and who have vision and initiative—vision to see the railroad's proper place in our modern transportation system, and initiative to experiment with applications of the newer forms of transportation to railroad service. That vigor will spell success, just as surely as the opening of the Pacific Northwest brought success to the men who pushed their railway lines into it.

Already the progressive managements of a few railroads have thrown tradition to the winds and have inaugurated radical departures from accepted methods of handling certain classes of freight. More of such changes are needed, but in many instances those who would undertake them are hampered by restrictions beyond their control. Within a short time the Interstate Commerce Commission is to undertake a thorough study of railway practices to see whether many of them are unnecessary. Obviously the commission's study will bear only on present practices. Doubtless it will reveal much unnecessary red tape and many practices which should be discontinued. But its concern will be with the past; it cannot plan for the future. Only in the elimination of unnecessary restrictions of the commission's own making can this study facilitate progress in the coming years. The railroads' present problems cannot be solved by commission investigations. They must be solved by men with the freedom from the fetters of tradition, men with the farsighted business daring of the railroad pioneers who opened up the Pacific Northwest.

Too Many Graduates?

"TOO many engineers are being turned out by our colleges and universities. Some way should be found to discourage young men who plan to take up engineering as a profession." These and like sentiments are heard on all sides every year at this season. They are so often repeated that many of us have come to accept them as axiomatic. But will they a stand analysis? Do they not indicate too narrow a view of the possibilities of engineering education?

Many members of the engineering profession seem to feel that their profession is unique in having a surplus of young aspirants. But the same is true of other professions: law, medicine and architecture are equally familiar with the complaint of overcrowding. In all these professions, as in engineering, except possibly the medical profession with its longer period of training, there is a great weeding out of men after graduation. Many of the mediocre and unfit men, unable to make their way as engineers, leave the profession, but with them go also many of the brightest minds, the more aggressive ones, who realize that engineering with its limited opportunity is not for them and so make the break at once.

The men remaining in the engineering profession range all the way from the brilliant and able men who are to become its leaders in future years to those who will never get farther up the scale than a drafting board or computer's table whether through force of circumstances or through lack of ability and application. Of this group of incipient engineers, many more will leave the profession as their capabilities in other lines develop. One has but to examine the past record of many of our high railway officials, for example, to see how many of them started out as engineers. While no longer engineers in the narrow sense, they are a valuable byproduct of engineering training. Most of them look back upon engineering training as a definite asset, not because it is specialist training but because it is a fundamental education.

Would these men who leave the profession have been better fitted for their life work had they taken a purely academic course in college? Is the value of engineers and engineering to the community less or more widely appreciated by their having been trained as engineers? Has the fact that they were trained as engineers or have held engineering positions for a few years been a detriment to those who remained in the profession? The conclusion is inescapable that the profession benefits rather than loses through the training of these men as engineers.

If, then, we look upon engineering school training as a desirable fundamental training for life work rather than as a specialist training, the supposed advantages of restricting the number of engineering students disappear. On the assumption that more and more young men will seek college training with the coming years and that engineering courses will be devoted more to fundamentals and less to specialization, the aim of the profession should be to encourage rather than to discourage young men who consider taking an engineering course in college. Not only will this result in a wider recognition of the value of the application of engineering principles to many of our everyday problems but it should also add to the number of men whose brilliant achievements bring honor to the profession. Who can say of a group of young men applying for college entrance that this one will make a successful engineer and that one will be a failure? Viewed from this angle, attempts to restrict the number of engineering students are against the interest of both the engineering profession and the community. Any form of restriction is sure to eliminate some men destined to become leaders of engineering thought or leaders in other fields on the strength of their engineering education.

Let us then broaden our view of the function of engineering education. Considered as a fundamental training for young men inclined toward the study of the sciences, such a course of training should be urged upon every young student showing natural aptitude in that direction. There may be several men for every engineering job that is available when the colleges turn out their graduates each year, but there will not be too many for the good of the profession. The crowding from the bottom will stimulate those already in the profession to greater effort, and the wide and ever wider dissemination of a knowledge of the fundamental principles upon which all engineering is based will broaden the usefulness of the profession and will increase the opportunities for its members. There cannot be too many graduates turned out by our engineering schools!

Truck Haulage Perfected

IN THE construction of large engineering works far from railways, truck haulage is rapidly developing into schedule transportation of large tonnages. In these operations the truck line takes on all the functions of an extension of railway track and service and lacks none of the regularity and capacity which the needs of construction demand of railway service. Notable examples of such haulage service are the power plant construction in northern Manitoba for the Hudson Bay Mining & Smelting Co. and the building of Deadwood dam of the U. S. Reclamation Service described in our last issue.

In both these operations an emergency haulage problem existed. At the mining works 25,000 tons of freight had to be transported 68 miles from railhead over road passable only after being solidly frozen in December and before the spring breakup in March; at the Deadwood dam a fast haulage schedule over 60 miles of mountain road had to be maintained from May to December so that construction could be completed before winter closed the road.

Only fast, reliable service met these emergencies. It was insured by special-equipment trucks with crawler traction wheels for the winter operation and trucks with dual wheels for the summer operation—and particularly by scheduled loading, running and servicing as precise as that of fast freight service on a trunk railway. In brief, truck haulage was subjected to capacity loading and timetable regulation. In the winter operation 337 round trips of 136 miles were made with an average load of 70 tons every 40 hours with only one load upset and delayed. The Deadwood dam truck operations recorded the even more remarkable performance of two 120-mile round trips every 24 hours, though with only 6- to 7-ton loads hauled.

Comparison is not pertinent under the conditions; the essential lesson of both operations is that large-volume, scheduled truck transportation has become a highly perfected tool of the construction engineer.

Fig. 1—Site of the Madden Dam

The main dam is to be built from the crest of the ridge at the left across the valley to the steep bluff on the far side of the river. The sandstone in which the dam is to be built outcrops in that bluff.

Madden Reservoir to Increase Water Supply of Panama Canal

Reservoir formed by 220-ft. concrete dam on Chagres River will provide water for four times the present canal traffic —Construction work to start this fall

CONSTRUCTION of a reservoir on the Chagres River in Panama to augment the water supply of the Panama Canal was authorized by an act of Congress in March, 1928, and an appropriation of $250,000 was made for surveys and borings. The study has now progressed to the point where bids for the construction of the dams required for the reservoir have been called for.

The ultimate need for storage over and above that provided in Gatun Lake was recognized as far back as the days of the second French canal company and the site for a storage reservoir on the Chagres River above the village of Alhajuela was selected, but no detailed studies of the site were made. Further recognition of the need for such a reservoir was made in the agreement between the United States government and the Republic of Panama by a provision that the Canal Zone could be enlarged when necessary, payment being made for lands other than public land for such enlargement. In recent years the United States government has acquired an area of 20.9 square miles for the reservoir site, roughly the area below the 260-ft. contour above the site of the proposed dam across the Chagres River.

Present Supply Limits Canal Capacity

Water Supply—The accompanying figures taken from the report of the governor of the Panama Canal for the fiscal year 1930 show the amount and source of the water supply for the canal.

The dry season of the fiscal year 1930 was somewhat longer and drier than usual, but its record did not approach the record established in the years 1920 and 1926. During the past seventeen years there have been eleven years with a water supply greater than that of 1930 and five years with less. In commenting upon this in his report for the year 1930, Governor Burgess said: "From the standpoint of water supply, the 1930 dry season began Dec. 13, 1929, and ended May 1, 1930. During this period of 140 days the consumption of water was at the rate of 3,169 sec.-ft. as follows: evaporation from lake, 800; Gatun Lake lockages, 1,025, hydro-electric power, 1,287; municipal uses and leakage, 57. The total yield of the watershed (of which the Chagres River watershed above Alhajuela supplied 59 per cent) was equivalent to 1,524 sec.-ft. Hence it was necessary to draw on storage at the rate of 1,645 sec.-ft., or 4.36 ft. of depth on the lake surface. The yield of the watershed during this period was equivalent to 4.04 ft. depth. The elevation of Gatun Lake was lowered from 87 ft. on Dec. 13 to 82.64 ft. on May 1, 1930, although a momentary minimum at Gatun of 82.57 ft. occurred on April 30. The water saved by use of the Miraflores diesel plant for power amounted to 2,200,-

	Per Cent of Total, Fiscal Year		Billion Cubic Feet, Fiscal Year	
	1929	1930	1929	1930
Run-off above Alhajuela	38.3	40.1	80.28	63.52
Yield from land area below Alhajuela	41.6	38.6	87.05	61.24
Direct rainfall on lake surface	20.1	21.3	42.06	33.78
Total yield	100.0	100.0	209.39	158.54
Evaporation from lake surface	10.3	13.1	21.60	20.72
Gatun Lake lockages	20.2	25.2	42.26	40.04
Hydro-electric power	21.0	28.7	43.87	45.45
Spillway waste	50.6	33.9	106.04	53.83
Municipal, leakage, etc	.8	1.0	1.73	1.60
Decrease in storage	—2.9	—1.9	—6.11	—3.10
Total uses and losses	100.0	100.0	209.39	158.54

000,000 cu.ft. and that saved by special measures at the locks to 4,000,000,000 cu.ft., a total of 6,200,000,000 cu.ft., or the equivalent of 1.36 ft. depth on Gatun Lake. Had there been no saving of water the minimum elevation of Gatun Lake would have been 81.28 ft. instead of 82.64 ft."

The quantity of water available for lockages during a typical dry year, according to Col. Burgess, is 31 billion cubic feet. This is sufficient for 32 lockages per day during the period when it is necessary to draw upon storage. The average number of lockages in 1928 (the peak year) was 16.7. Col. Burgess estimates (*The Military Engineer*, Sept.–Oct., 1929) that in order to avoid congestion on peak days the third set of locks and an additional water supply should be available when the average number of lockages reaches 27 per day. By the construction of a reservoir above Alhajuela the lockages can be increased to 60 per day.

However, the additional supply to be provided by the new reservoir on the upper Chagres River will be needed in advance of the construction of the third set of locks

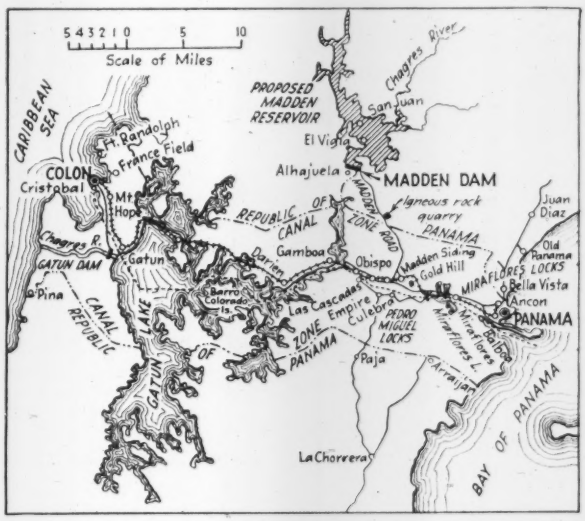


Fig. 2—Panama Canal Zone, showing site of the Madden reservoir

in order to keep the depth of water in Gaillard Cut from becoming less than from 42 to 43 ft. Also, it is needed to reduce the interruptions to canal traffic due to floods and to provide more water for hydro-electric power, thus saving on the cost of operating the diesel-electric power plant. During eight months of the year much excess water enters Gatun Lake and has to be spilled into the sea. During the remaining four months the inflow is wholly inadequate to meet the demands for water for lockages, generation of power and municipal purposes in addition to the heavy losses resulting from evaporation. The maximum height to which Gatun Lake may be filled is 87 ft. The minimum lake elevation permitting safe navigation through Gaillard Cut is 80 ft. This gives a margin of 7 ft. of storage available for drawing upon during the dry season.

Additional Supply Authorized

Construction of a reservoir (named Madden reservoir by Congress) to provide added water, and the construction of a concrete road from the Canal Zone up to the site of the proposed dam, were authorized by Congress in 1928. Subsequently superficial examination of the site was made by Frank Reeves and Clyde P. Ross, geologists of the U. S. Geological Survey, and a program of field investigations and borings was laid out. In July, 1929, these investigations and the preliminary studies for the dam were placed under the direction of E. S. Randolph, designing engineer, Panama Canal. The field examination included the sinking of 25,000 ft. of drill holes to determine the character and condition of the underlying rock at the dam site and along 8 miles of impounding ridges. A critical examination of the dam site and the reservoir area was also made to determine the possibility of leakage through the underlying limestone rock. This latter work included the exploration and sounding of caverns in the rocks and dye tests to determine the direction and extent of underground flow, and water pressure tests of drill holes to determine the extent of possible leakage below the surface. Both physical and chemical tests were made upon the rock by the Bureau of Standards to determine its strength and its resistance to leaching, and tests under combined compressive stresses were made at the University of Illinois. Tests made at the Panama Canal laboratories at Miraflores included simple compressive and chemical tests and tests under repeated loading, also a jet test to measure the erosive resistance of the rock. A bearing test was made upon the rock in its natural bed in which the loading was carried to 7,500 lb. per sq.in.

Before approval of the site of the dam, the elevation of the flow line and the type of the dam and spillway a consulting board was convened in the Canal Zone to study all field data on the site of the dam. This board was composed of R. F. Walter, chief engineer, U. S. Bureau of Reclamation; J. L. Savage, chief designing engineer, U. S. Bureau of Reclamation; A. J. Wiley, consulting engineer, Boise, Idaho, and F. L. Ransome, consulting engineering geologist, Pasadena, Calif. The board's studies were concluded in January, 1931. It recommended a straight gravity-type concrete dam having a spillway over the dam, which would have a top elevation of 263 ft. above sea level. The dam is to be flanked on the south end by an earth, gravel and rockfill structure with a concrete paved upstream face. There are to be thirteen smaller dams of earth, gravel and rockfill construction for closing off side valleys around the reservoir. Typical details of these dams are shown by the drawings reproduced in Fig. 3.

Reservoir Capacity—The normal surface of the Madden reservoir is to be held as close as possible to El. 240, or 140 ft. above low water in the river. This gives a reservoir capacity of 22,056,000,000 cu.ft. (506,000, acre-ft.). The permanent crest of the dam is to be at El. 232 and drum gates 100x18 ft. on the spillway crest will be used to hold the reservoir level at El. 250. Estimates of the runoff indicate that the 1,000-year flood will raise the reservoir to El. 263. At that level 12,000,000,000 cu.ft. of storage will be available for flood control.

Main Dam—The concrete portion of the main dam will be about 900 ft. long. Of this, 436 ft. will be a spillway section and the remainder a bulkhead section. Intake works, penstocks and control valves for a power house are to be built into the bulkhead section at the south side of the river. Excavation for the base of the dam is to be carried well into solid rock and a cutoff trench is to be excavated beneath the upstream heel. Grout holes at 5-ft. intervals are to be drilled into the rock below the trench. The dam is to be built in 56-ft. sections. Pipes for pressure grouting the vertical contraction joints between these sections are to be built into the dam. The

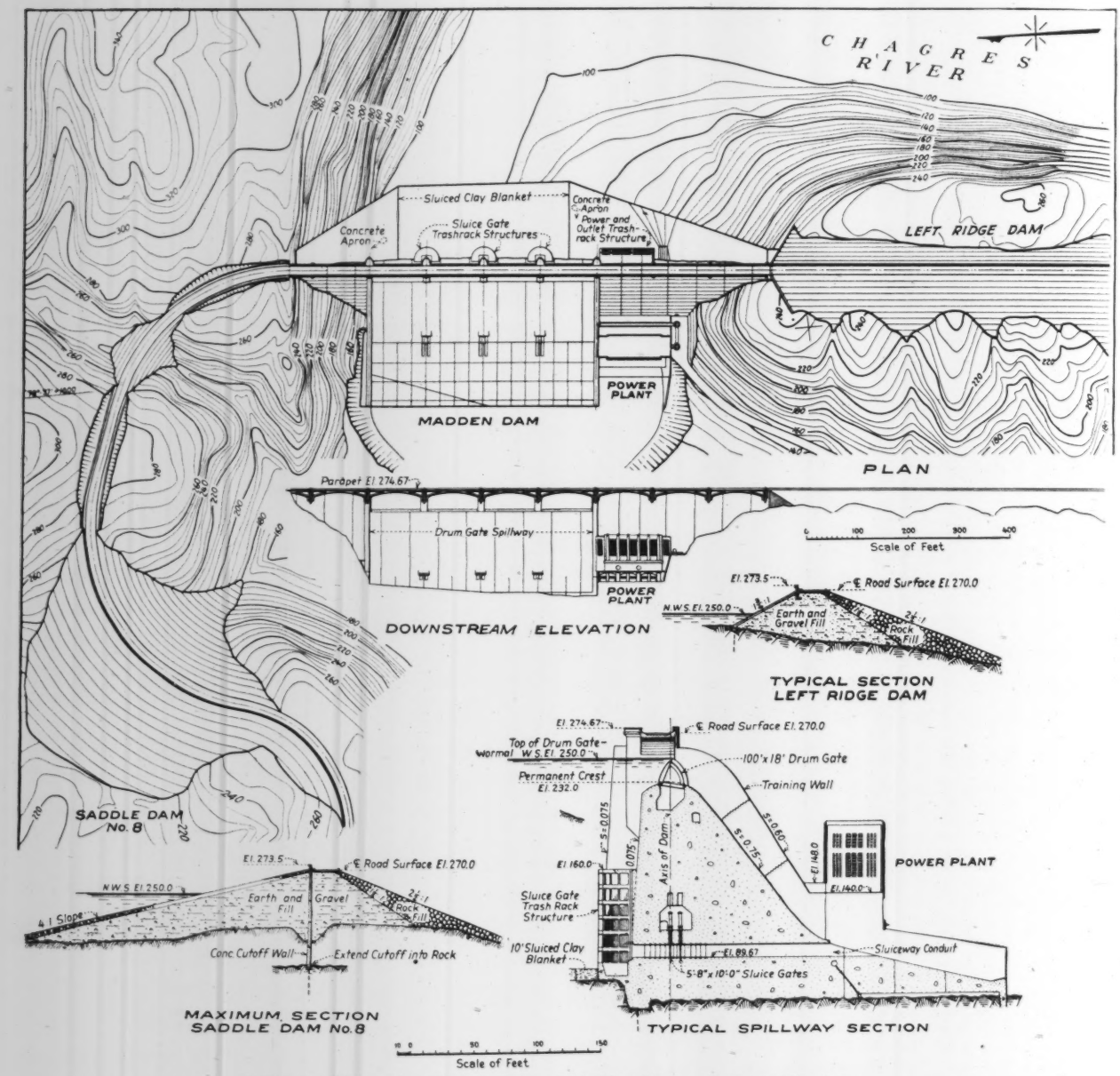


Fig. 3—Plan and typical sections of Madden Dam and the saddle dams

maximum height of the dam to the roadway will be about 220 ft.

A clay blanket is to be placed on the stripped bedrock for 150 ft. upstream of the dam for almost the full width of the spillway section; above the abutment sections there will be concrete blanketing, 20 to 150 ft. wide.

The bedrock at the site of the dam is a massive fine-grained gray calcareous sandstone that is practically impermeable. Some of the grout holes at the dam are expected to penetrate through this bed to a coarser and more calcareous sandstone that probably is more permeable. Some sink holes and caverns occur in one of the ridges below the flow line of the reservoir. These are to be filled with clay.

Earth Dams—The extension of the main dam along the ridge to the south is to be embankment, part dumped rock and part rolled earth and gravel, with concrete paving on the upstream face, topped with a 3-ft. parapet. This structure will have no corewall. The thirteen saddle dams will be of similar character but without concrete paving. Only one of them, the high one to close off the side valley coming in below the main dam on the north side, is to have a corewall. A typical section of this structure (saddle dam No. 8) is shown in Fig. 3.

Aggregates adequate for concrete are available in the river channel near the dam, and suitable material for the earth and gravel fills is available in the vicinity of the work. Igneous rock for riprap also is available within 6 miles of the dam.

Provision is made at the power house for three units of 8,000-kw. capacity. It is probable that only two units will be installed at the time the dam is built.

The work is to be carried on under the direction of Col. Harry Burgess, governor, and Col. Julian L. Schley, engineer of maintenance of the Panama Canal.

English Refuse Burner Produces Three Salable Products

High-pressure steam, hard graded clinker and magnetically removed metals sold—Dust only dumped

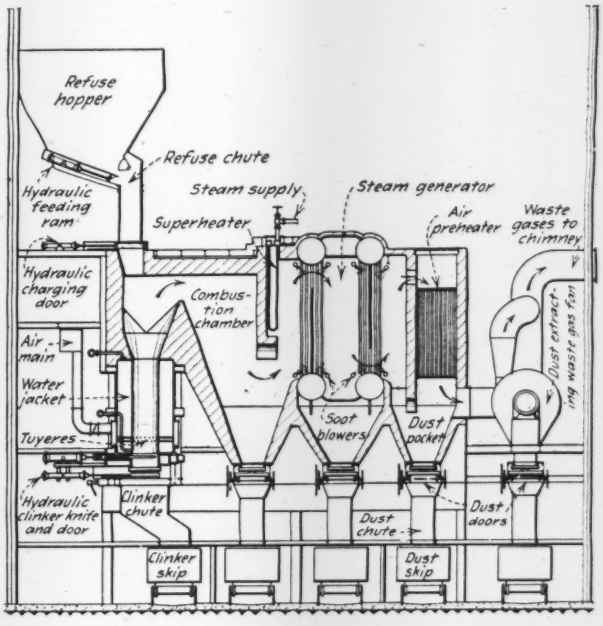
A STEAM-PRODUCING refuse incinerator has recently been installed in Huddersfield, England. It has a capacity of 130 tons (2,240 lb.) of calorific value 5,000 B.t.u. per day of eighteen hours and includes eight cells of the Woodall-Duckham shaft-furnace type arranged in four units each with water-tube boiler and air preheater. For 40 years Huddersfield has burned its refuse, but in recent years the old plant became inadequate, necessitating the "tipping" of a large amount of refuse. Conditions imposed on the new plant by the city officials in their specifications required a constant output of steam, maximum steam production per pound of refuse burned and a greater degree of mechanization of refuse handling.

Tests carried out last July with the town's refuse, from which metals were removed and 11 per cent of gas-works ashes added, give the following results: tons burned, 506.55 in four cells (two boilers); average weight per cell per hour, 2,183 lb.; tons clinker recovered, 77; tons dust recovered, 78; water evaporated per hour, 19,012 lb.; water evaporated per pound of refuse consumed, 1.944 lb.; average temperature steam superheated, 551 deg. F.; average equivalent evaporation from and at 212 deg. F. per pound of refuse consumed, 2.463 lb. The calorific value was 3,435 B.t.u. per pound net as charged, rather than the 5,000 calorific value of the contract. On the basis of 3,435 B.t.u. only 1.9 lb. of steam was required to be evaporated from and at 212 deg. F. per pound of refuse consumed.

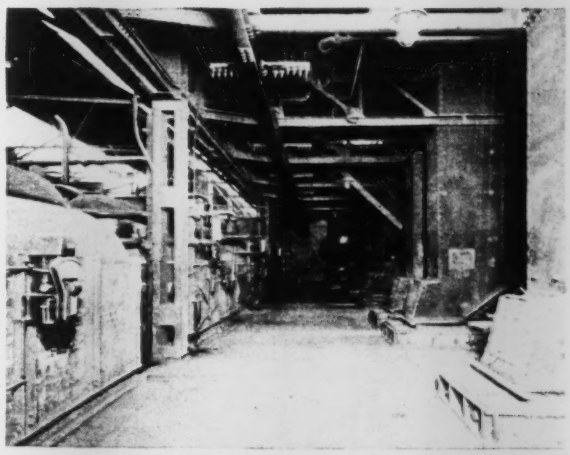
The following description is taken from a report presented to the officials at the time of opening the plant in October, 1930.

The town's refuse is discharged from collecting vehicles into a main storage pit situated below ground level. From this hopper the refuse is lifted by means of a grab bucket and conveyed by an electrically driven pushbutton telpher into a rotary distributor. The material is discharged from the distributor through a magnetic separator for the extraction of magnetic metals on to a conveying belt, which enables salvage of non-ferrous metals. The metals are delivered from the separator and the belt to the floor alongside the baling presses. The metal-free refuse is discharged into an auxiliary storage pit. From this auxiliary pit the refuse is delivered by means of a second grab and electrically driven pushbutton telpher into overhead auxiliary storage hoppers. The two telphers are interchangeable.

From these hoppers the refuse is fed by means of hydraulically operated rams direct into the incinerator cells. In these cells the refuse is burnt at high tempera-

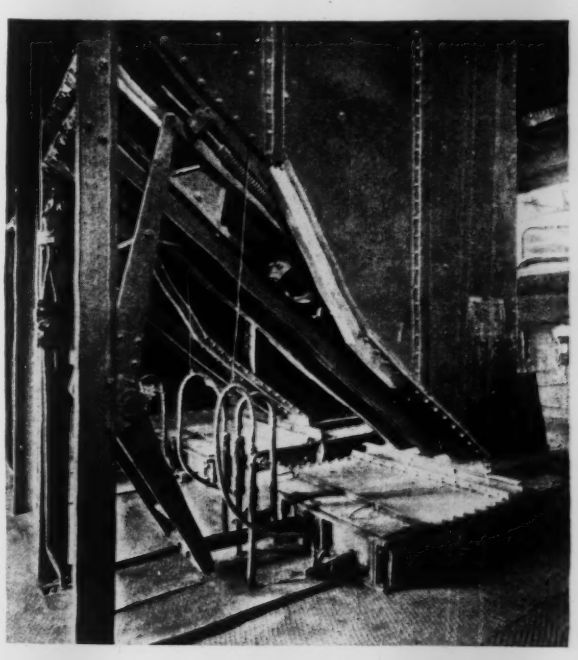


Huddersfield steam-generating refuse incinerator



Top charging platform over combustion chambers

Refuse chutes at right with hydraulic charging door at floor level. Telpher over head to drop carcasses through removable floor plates directly into combustion chambers.



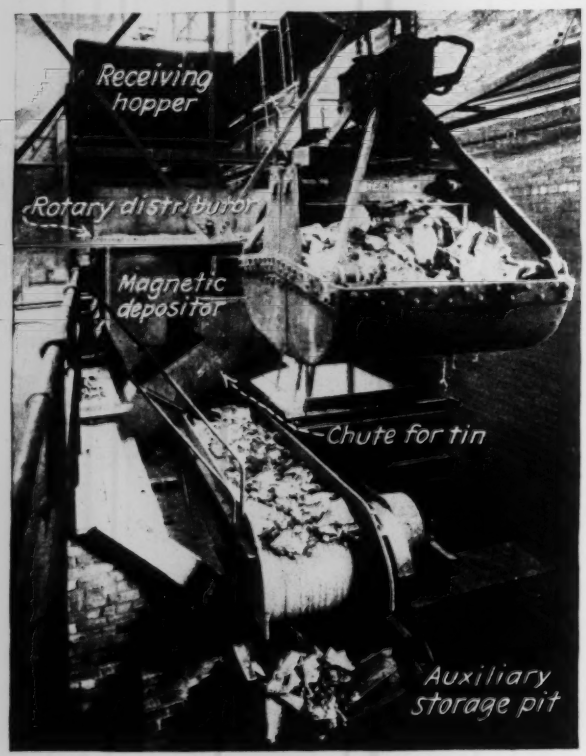
Cell-charging mechanism

Charge door is opened as feeding ram forces refuse into cell.

ture by means of preheated high-pressure air supply delivered through tuyères equally and circumferentially placed at the lower part of the steel water-jacketed shaft furnace. The non-combustible portion of the refuse is converted into a hard clinker.

The products of combustion from the cells of each unit are drawn through water-tube boilers and ejected into a chimney by means of dust-extracting waste-gas fans. Each boiler is fitted with dust-collecting chambers and hoppers with suitable sliding outlet doors so that the dust can be removed while the plant is in operation. The steam generated by the boilers is supplied to the electricity department of the city.

Each cell is provided at its base with a hydraulically



Refuse partly free of metal coming from separator

A magnetic separator of screen type removes magnetic metals; other metals are picked out by hand from conveyor by man standing where shovel and fork are seen

operated clinker knife and door through which the clinker is discharged into a skip running on rails in the floor underneath the cells. When filled the skip is run into a quenching tower in which the clinker is quenched by means of an overhead water spray, the smoke and steam rising inside the tower and escaping to the atmosphere at a suitable height above the roof. After the clinker has been quenched each skip is taken along a rail track on the floor and discharged into a clinker crusher, from which the crushed material is elevated into a screening plant, which grades the clinker as required. A magnetic separator is arranged to remove magnetic particles from the clinker before it is graded.

As reported by *The Surveyor* of Oct. 17, 1930, the whole installation, which is inclosed in a stone and brick building, cost $300,000. The test was made under the supervision of H. A. Bennie Gray, consulting engineer for the city, and exceeded the guarantee by 30 per cent. It is estimated that 28,000 tons of refuse will be handled per year, from which will be recovered, in addition to the steam, 500 tons of metal and 5,000 tons of hard clinker, both salable. Only the dust, which is 15 per cent of the refuse, will need to be dumped. H. Neaverson is the superintendent of the transport and cleansing department.

Cast-in-Place Construction Applied in New Concrete House

Precast studs and simple formwork are the basis of a building method adapted to any design and requiring no special equipment

WALLS cast in place around precast studs are being applied by A. H. Olmsted, of Rye, N. Y., to the construction of concrete houses that are free from any restriction of standardized design and costly equipment, while retaining the adaptability and conveniences of ordinary housebuilding methods. A small mixer, two or three wheelbarrows, some shovels and a light hoist are all the construction equipment needed, says the builder. Essential elements of the Olmsted method are concrete studs with nailing strips cast on, light wooden outer forms made in panels half the story height, trough-shaped inner forms of insulating wallboard, horizontal reinforcing ties in the walls (which remain in place), and tile or pan-ribbed floors.

Studs are 2x8 in. or wider, to meet building code requirements, with a nailing strip fixed to one or both edges in casting. A notch in the lower end assists in placing the studs correctly by engaging a raised rib at the edge of the floor below, and a similar notch in the upper end helps to tie the studs to the reinforced-concrete cap and floor above. Holes cored in the studs assist in bonding the wall and permit of placing reinforcing bars above and below the windows or at half-story height. Floors are also of reinforced concrete; the house shown in Fig. 1 has first and second floors of tile-filled-rib construction with 2-in. slabs of concrete with sleepers for wood floors or troweled smooth for tile or linoleum. The attic floor is a 2-in. slab of "aerocrete" on rib lath carried by "Junior" steel beams. The roof is of slate on sheathing supported by wood rafters, with rock-wool filling for insulation and fire protection.

With this construction the walls have a thickness of 8 in. of concrete at the studs and 3 or 4 in. between studs; large air spaces (lined with form insulating board) between the inner part of the wall and the plastering give room for pipes and wires and also provide heat insulation. The walls may be finished with stone or brick veneer, stucco, shingles or siding as desired; where necessary a nailing strip on the outer edge of the studs provides for attachment of the finish.

Bearing partitions may be of solid concrete. Non-bearing partitions are plastered on 2x4-in. studs taken from the wall-form supports, or may be of steel-stud or other light fireproof construction. All finish and interior equipment are installed in the same manner as in a house of ordinary construction.

Mr. Olmsted gives the cost as not more than 3c. per square foot for materials in excess of wood-frame construction, and claims that where local sand and gravel are cheaply available the cost difference may be reversed.

Fig. 1—House in Rye, N. Y., in which precast studs and cast-in-place walls and floors make the structure practically fireproof

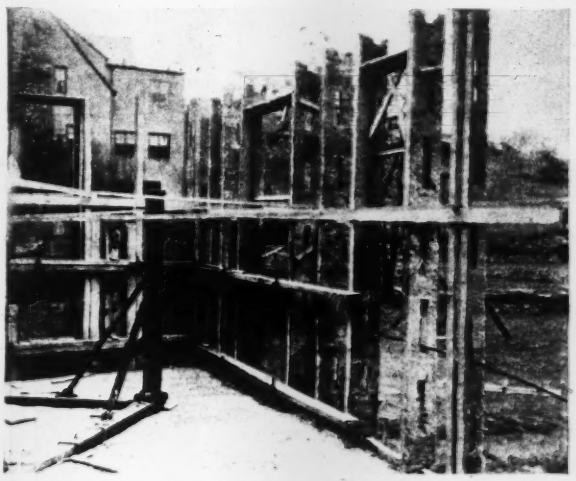


Fig. 2—Precast studs with outer forms of wood and inner forms of insulating wallboard are the essential elements of a new form of concrete-house construction

Floors are of reinforced-concrete rib-and-slab with tile filling.

The form casts are reduced to a minimum. As compared with other concrete house-building methods he claims flexibility of adaptation of the method to any design of house without special forms or equipment.

Based on many years of experience in concrete-house construction by other methods Mr. Olmsted summarizes the status of the art as follows:

"Edison, Ingersoll, Lambie and other pioneers of the concrete house produced a system of forms rather than a method for building permanent and fireproof houses adapted to all the refinements and architectural possibilities easily obtained in frame houses. Their standardized forms did not appeal to the individual home owner and generally not to the architect.

"In the Edison and Lambie systems, interchangeable steel-frame unit forms held together with clips were used; the forms for a six-room house weighed about 30 tons and not only were costly but required much rehandling of great weights. In the Ingersoll system the whole house was poured at once in wooden forms, which latter had to be strong and heavy and therefore fairly standardized. A few experimental houses were cast at Phillipsburg, N. J., but the idea did not win wide acceptance.

"At Forest Hills, Long Island, a group of buildings were constructed from large precast units erected by derricks; this method also is evidently not adaptable to the individual house. Huber Bros., Syracuse, have built a number of attractive concrete residences successfully.

"None of these methods is as freely adaptable to any architectural form or as cheap in equipment and labor costs as the one I am using at Rye."

The wall forms used by Mr. Olmsted are made in half-story height. With studs not more than 20 in. on centers the pressure of the concrete is small so that light forms are adequate. The form panels are re-used for the full height of the building. Inner forms are of insulating wallboard bent to recessed form to leave a 3- or 4-in. air space inside the plastering for most of the width between studs. Both inner and outer forms are readily wired to the studs. S. C. Schweizer is the architect, and A. H. Olmsted is the builder.

Welded Beams Resist Impact Favorably

A series of impact tests on built-up welded and riveted beams approximately 12 in. deep and of 7 ft. span has been made at the Kieff Polytechnic Institute in Russia. Some of the beams were spliced at the center, and others contained two splices symmetrical about the center. The tests were made by successive blows from a heavy hammer, with deflections read after every blow. They are reported in the *Journal* of the American Welding Society for June. The authors of the paper, who made the tests, conclude that (1) welded beams offer no less resistance to dynamic than to static loading; and (2) welded beams offer more resistance to dynamic loads than riveted beams. Comparison of different beams was made on the basis of the work done by the hammer during its fall, expressed by $Q\ (h + f)$, in which Q is the weight of the hammer, h the height of the fall and f the deflection of the beam.

Composition of Earth Dams

Part III: New Data

Conklingville dam in New York built by the semi-hydraulic method—Niederwartha and Friedland dams in Germany show refinements of grading and placing of materials not common to American practice

A Discussion of the composition of earth dams, begun in our issue of Dec. 18, 1930, p. 954, was continued in the issues of June 11, 1931, p. 960, and June 25, p. 1044. The following articles by Edward H. Sargent and J. Albert Holmes add new data relating to materials in earth dams. The Conklingville dam, discussed by Mr. Sargent, is one of the most recent dams of this type to be put into service. The two German dams, described by Mr. Holmes, are of special interest in that they show more elaborate grading and methods of arranging materials, which differ from American practice. —Editor.

Conklingville Dam Built by the Semi-Hydraulic Method

By EDWARD H. SARGENT
Chief Engineer, Hudson River Regulating District, Albany, N. Y.

AN EARTH DAM, built by the semi-hydraulic-fill method, was completed during the past year by the Hudson River Regulating District. It is located on the Sacandaga River near Conklingville, N. Y., about 5 miles above the confluence of the Sacandaga and Hudson rivers, where it now forms a reservoir of 37.8-billion cu.ft. capacity (868,000 acre-ft.) for flood control and for the regulation of the flow of the Hudson River for power, navigation and sanitation.

The Conklingville dam is 1,100 ft. long and 100 ft. high. It has a top width of 40 ft. at El. 795. The spillway crest is at El. 771. The side slopes are as shown in the maximum section, Fig. 1. Subsequent to the award of the contract for construction, it was decided to increase the rock excavation for the spillway channel. Material taken out of this channel was spoiled at the downstream toe of the dam, thus accounting for the unusual downstream section.

As shown in Fig. 1, the original design of the dam called for a core with a top width of 30 ft. at El. 780, which is 9 ft. above the spillway crest, and side slopes of 10 on 7; but, as indicated by the beach line sketch of the section shown in Fig. 1, the core as built is somewhat larger than originally planned.

Preparatory work included stripping the entire area under the earth portion of the dam of all vegetable matter. The area within the outer limits of the core was cleared of top soil to a depth of 5 ft., and a cutoff trench, 20 ft. deep and 90 ft. wide, was excavated along the axis of the dam for about two-thirds of its length. For the remainder of the length of the dam the depth and width of the cutoff were reduced as the height of the dam increased.

Fortunately, very suitable material for the dam was found conveniently located in the hillside at the south end of the dam. Borrowpits, one upstream of the dam for the upstream dike and one downstream for the downstream dike, were located in this hillside.

The material in the borrowpits was of a hardpan formation requiring blasting to facilitate steam-shovel excavation. It consisted of an extremely fine compacted sand known as rock flour, in which were a considerable number of boulders of varying sizes. Because of the uniformity of this material practically no selection of materials was necessary except in the placement of the overburden in the unwashed area of the dam.

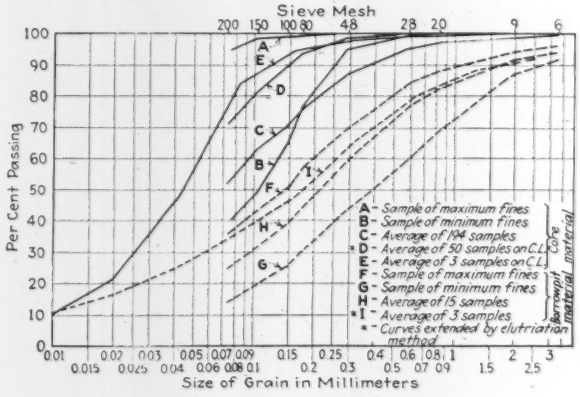

Sieve Mesh
200 150 100 80 48 28 20 9 6
Per Cent Passing
100 90 80 70 60 50 40 30 20 10 0
A
E
D
C
B
F
I
H
G
A - Sample of maximum fines
B - Sample of minimum fines
C - Average of 194 samples
D - Average of 50 samples on C.L.
E - Average of 3 samples on C.L.
F - Sample of maximum fines
G - Sample of minimum fines
H - Average of 15 samples
I - Average of 3 samples
* - Curves extended by elutriation method
Core material
Borrowpit material
0.01 0.02 0.03 0.05 0.07 0.09 0.15 0.25 0.4 0.6 0.8 1 2 3
0.015 0.025 0.04 0.06 0.08 0.1 0.2 0.3 0.5 0.7 0.9 1.5 2.5
Size of Grain in Millimeters

Fig. 2—Analyses of borrowpit and core material

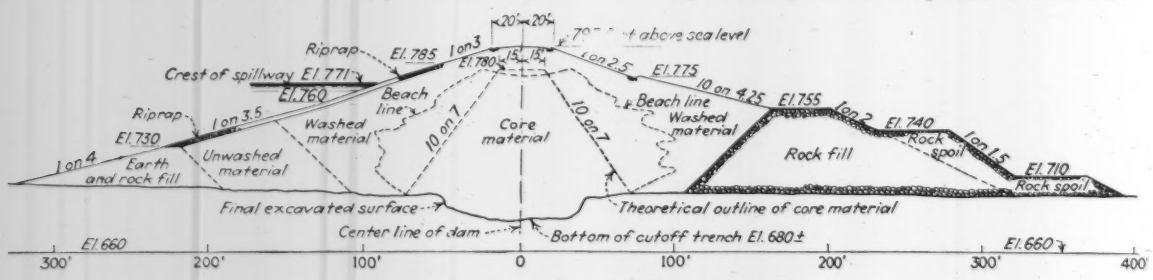


Fig. 1—Maximum section of the Conklingville dam

Fig. 3—Monitors washing fines into the segregation pool of Conklingville dam

At the time this photograph was taken, Aug. 9, 1929, the upstream dike was at El. 745 and the downstream dike at 755. The pool was at El. 722 and the core had been sluiced to El. 705.

Material from the pit was loaded into standard-gage dump cars and transported to the upstream and downstream dikes, where it was dumped and sluiced into place by two hydraulic giants mounted on rafts in the segregation pool. The specifications called for a monitor unit duty of 750 gal. per minute, working under a head of about 300 ft. Water was furnished to the monitors by centrifugal pumps driven by electric motors of 100 and 125 hp. Nozzle diameters of $1\frac{1}{2}$ to $2\frac{1}{2}$ in. were used, the size employed depending upon the width of the beach.

Core Material—The results of analyses of the borrowpit material and of the core material are shown in Fig. 2. The average of the borrowpit samples show 40 per cent passing the 100-mesh sieve and 24.5 per cent passing the 200-mesh sieve. The average of these samples, analyzed by the elutriation method, showed 10.5 per cent finer than 0.01 mm. In all, 383 analyses of the core material were made, and they show, it is believed, that most satisfactory results were obtained.

The average of 50 samples taken along the center line of the core showed 90 per cent passing a 100-mesh sieve and 71 per cent passing a 200-mesh sieve; and the average of three samples from along the center line, analyzed by the elutriation method, showed 10 per cent finer than 0.01 mm. The average of samples taken within 25 ft. upstream and downstream of the center line showed 78.8 per cent passing a 100-mesh sieve and 60.1 per cent passing a 200-mesh sieve.

Percentages of material passing a 100-mesh and a 200-mesh sieve and the location of the samples in a typical section of the dam are shown in Fig. 4.

Sampling Method—For obtaining samples of the core material a special device was made on the job. It consisted of a piece of 4-in. pipe about 24 in. long cut at a 30-deg. angle at one end and threaded for a pipe cap on the opposite end. One end of a rope was attached to a ring in the pipe cap, and the other end was attached to a bridle located about 3 in. from the bevel on the short side of the pipe. A paper carton such as is used for packing ice cream was used as a sample container. In operation, the carton was placed inside the pipe and the cap screwed on. Then, using the rope attached to the cap, the sampler was lowered point down and worked vertically into the core material as far as desired. When the desired point was reached, the rope attached to the cap was slacked, and the sampler hauled up by the end of the rope attached to the bridle. In this way the beveled end of the pipe acted as a scoop for filling the pipe as it was withdrawn. Vent holes were provided for the escape of air when lowering the sampler and for the escape of water when it was withdrawn. The carton was prevented from sliding out of the open end of the pipe by the nut that held the bridle to the pipe. Upon withdrawal the cap was removed from the pipe to release the carton with its sample of the core.

Embankment Construction—Sluicing of material into

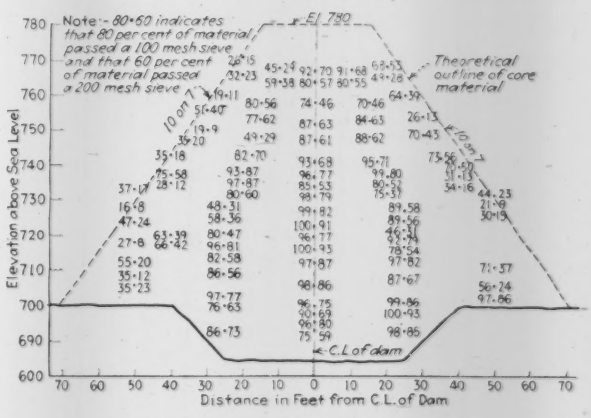

Note:- 80·60 indicates that 80 per cent of material passed a 100 mesh sieve and that 60 per cent of material passed a 200 mesh sieve
El 780
Theoretical outline of core material
10 on 1
1 on 1
Elevation above Sea Level
780
770
760
750
740
730
720
710
700
690
600
C.L of dam
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70
Distance in Feet from C.L. of Dam

Fig. 4—Core analyses at a typical section

TABULATION OF SETTLEMENT OF CONKLINGVILLE DAM

Date of Observation	Elevations A	B	C	D
May 21, 1930	794.91	794.83	794.77	794.90
June 12, 1930	794.71	794.60	794.62	794.62
July 16, 1930	794.66	794.54	794.58	794.57
Dec. 2, 1930	794.56	794.46	794.49	794.48
June 4, 1931	794.49	794.33	794.35	794.33

Days Difference	Settlement Between Observations, Ft.				Average
22	0.20	0.23	0.15	0.28	0.22
34	0.05	0.06	0.04	0.05	0.05
139	0.10	0.08	0.09	0.09	0.09
184	0.07	0.13	0.14	[0.15	0.12

the dam was continued until the core reached El. 776.5 with the pool at El. 780.8. From this point the core was topped off by dumping selected material into the pool. In all, 680,000 cu.yd. of earth and 159,000 cu.yd. of rock went into the embankment. Other items of the construction were 156,000 cu.yd. of earth excavation, 220,000 cu.yd. of rock excavation, 18,000 cu.yd. of riprap and 16,000 cu.yd. of concrete.

Settlement of the Dam—Four settlement pipes 16 ft. long were set in the dam. They were embedded in concrete blocks, which were placed in the top of the sluiced core. The results obtained in checking the settlement that has occurred to date are given herewith. They speak for themselves and indicate that settlement of the embankment has almost completely ceased.

Leakage—During this season it is proposed to endeavor to locate the hydraulic gradient through the dam when the reservoir is full, also to determine the leakage. Construction of the dam was begun on December 23, 1927, and it was completed in July of last year. However, sufficient progress had been made by March 27, 1930, to permit closing the outlet gate for the accumulation of water in the reservoir. By the end of June the reservoir had filled to El. 760. A measurement made on July 17, about 300 ft. below the dam when the reservoir was still at El. 760, showed a flow of 1.65 sec.-ft., but as it is known that there are some small springs just below the dam and as the core was still consolidating and draining, it is believed that this amount is far in excess of the actual leakage and that the leakage will be found to be very small.

Organization—The Conklingville dam was built by the Hudson River Regulating District, of which the writer is chief engineer. Albert S. Crane served as consulting engineer on the design and construction of the dam and C. H. Hurley was field engineer. C. C. Chambers was resident engineer throughout the entire construction period. All sampling and testing was done under the direction of R. B. Davidson, assistant engineer. Contract for the construction of the dam was awarded to S. J. Groves & Sons Co., Inc.

* * * *

Variations From American Practice Found in German Dams

By J. ALBERT HOLMES
Consulting Engineer, Somerville, Mass.

AMONG the many notable structures described and illustrated in "Water Power Exploitation in Germany," the special publication of the Second World Power Conference, Berlin, 1930, appear two earth dams of interest to American engineers. Their interest lies in their design, which differs somewhat from American practice, principally in the more elaborate grading, arrangement and placing of materials. The water slopes of both the dams are protected by riprap or concrete paving. The more impervious material is placed on or near the water face, and perviousness increases downstream to provide internal drainage.

The care with which the dams were built is to be commended.

Niederwartha Dam—The Niederwartha is a pumped storage plant taking water from the Elbe by way of a shallow basin in the valley some 6 miles above Dresden, Saxony. The upper storage basin is situated in a side valley on the adjacent plateau about 1 mile from the power station. The average pumping lift is about 492 ft. The reservoir has a maximum depth of 108 ft. and an available capacity of 70 million cu.ft. on a drawdown of 31 ft. and a total capacity of 106 million cu.ft.

Geological study of the upper dam site disclosed suitable foundation conditions for an earth dam, but unsuitable for an economic masonry structure, bedrock being at too great a depth. The valley at the dam site has a slope of more than 4 per cent.

The crest of the dam at center line is 138 ft. above the valley floor, 115 ft. at the upstream toe and 164 ft. at the downstream toe. The crest width is 32.8 ft. and the base about 1,150 ft. The effective height of the dam—this is, the difference in elevation between the downstream toe where it joins the valley floor and the surface of the water in the reservoir—is 157 ft.

The most interesting feature of this dam is the arrangement of materials according to grain size and increasing porosity downstream. First there is a layer of clay, then a considerable body of sandy clay, then gravel, followed by mixed gravel and cobbles, and finally a rockfill extending to the downstream toe. These details are shown in Fig. 1. The materials were placed in horizontal layers 6 in. thick, and then rolled. The placing was done under very strict instructions and regulations.

The carefully placed clay blanket on the water side of the dam has a thickness varying from 6.6 to 29.5 ft.; it is carried out on the bed of the reservoir and extends 39 ft. below the original ground surface as a cutoff. The surface slope of the clay conforms with the sliding surfaces formed by wet clay, increasing from 3.5:1 at the crest to 4.5 : 1 at the base of the dam.

The surface of the gravel riprap protecting the clay blanket has a slope of 3.5 : 1 in the zone of the drawdown, decreasing in steepness and increasing in thickness as it approaches the bottom of the reservoir. The depth of riprap ranges from 3.3 ft. at the top to 11.5 ft. at the base of the slope. In the use of gravel riprap, American practice is mainly to place it in the zone of drawdown, especially on dams retaining large bodies of water where wave action is strong and destructive. Also comparatively few American earth dams are constructed with the major waterstop on the upstream face.

The reservoir back of the Niederwartha dam is of small area (74 acres), and the fetch of waves is short. The thickness of riprap provided in the exposed zone is probably sufficient to meet the conditions, and the greater thickness and weight at the base gives stability to the clay blanket.

Near the crest the downstream face of the dam has 2:1 and 3:1 slopes, the major portion having a slope of 4:1. The 4:1 slope is predicated on a probable future seepage line or surface, being parallel, or nearly parallel, to that slope. In India, when only materials of fine and nearly uniform grain size are obtainable for earth-dam building, the practice is to determine the seepage slope previous to use, and then to give the downstream face a slope not steeper than the seepage slope of the material.

In the case of the Niederwartha dam the use of the flat downstream slope is commendable, but it does not seem probable that the predicted conditions of seepage slope could take place in the successive masses of gravel, gravel and cobbles, and rockfill. The downstream slope of the dam is covered with 1.3 ft. of topsoil and is grassed.

No spillway was provided because of the small drainage area (1 square mile) tributary to the reservoir, and because there is a freeboard at the dam of 6.6 ft., and ample penstock capacity. A 39½-in.-diameter steel pipe line, laid in a tunnel through the hill abutting the left end of the dam, permits emptying the reservoir and diverting the streamflow.

Material for constructing the dam, 719,400 cu.yd., was obtained in the reservoir area adjacent to the structure and from the excavation of a channel leading to the intake. The plant was built during the years 1928 and 1929.

Friedland Dam—The Friedland dam is located on the river Alle at Friedland, East Prussia, near the eastern border of Germany and in the watershed of the Baltic Sea. The dam has a maximum height of 58 ft. and at the time of building (1920-1923) was said to be probably the highest earth dam in Germany.

The reservoir has a capacity of 706 million cu.ft. and a surface area of 1.62 square miles. The drainage area of 2,098 square miles above Friedland is only partly controlled by the reservoir. Provision is made at the dam for passing an amount 35 per cent in excess of the maximum flood of 16,770 sec.-ft. At the time of maximum flood only 3,600 sec.-ft. will pass through the turbines. Under the conditions of the then unusual dam height and large proportion of floodflow over turbine capacity, extreme care was exercised in chosing the site of the dam and in its design and construction.

The flood-discharge channel, in which high velocities are minimized, was designed as a result of experiments made at the river engineering laboratory of the technical college, Karlsruhe.

The dam is 2,660 ft. long and contains 222,400 cu.yd. of earth. As at Niederwartha the waterstop of selected clay is located at the upstream face of the dam and is carefully joined to the original ground and extended above maximum high water, as shown in Fig. 2. The waterstop is covered by a protective layer, and the slope is protected from water action by concrete and rock-paving. A series of berms prevents the pavement from sliding. There are changes in slope at each berm on both faces of the dam. Economy of material is obtained in such arrangement of berms and slopes.

Under the downstream slope is a zone of fine gravel, designed to intercept and carry away seepage from the main body of the dam. Seepage is said to amount to only a few liters per second. The crest of the dam and the downstream slope are covered with a heavy layer of topsoil and are grassed.

The main portion of the fill, surrounding and inclosing the waterstop and gravel zone, is a less impervious material. In constructing the dam the materials were thoroughly rolled in layers, and the selected clay of the waterstop was consolidated by rollers and air tampers.

The cross-section, Fig. 2, is taken through the conduit built to bypass the river during construction. Later, by the addition of an intake tower and gates, it was made available for increasing flood discharge. As indicated, special material was tamped around and over the bypass structure. The dam rests on a foundation of marl,

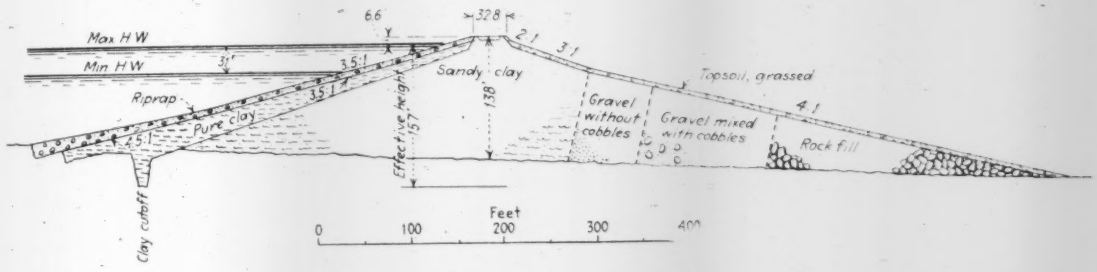


Fig. 1—Typical section of the Niederwartha dam, near Dresden, Saxony

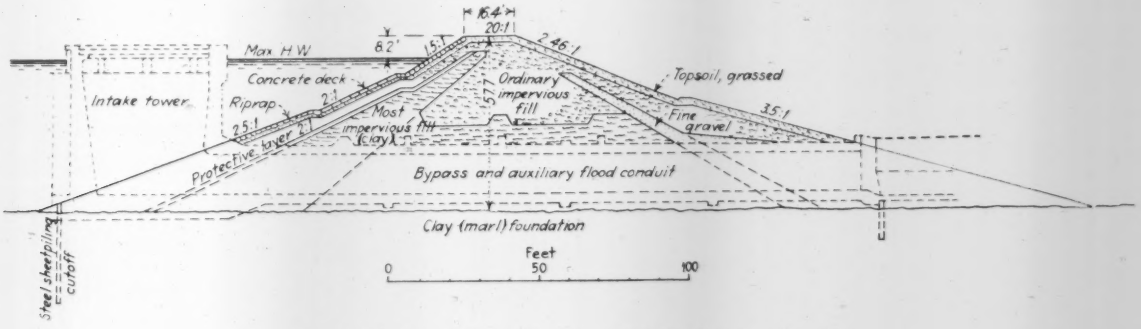


Fig. 2—Section of the earth dam at Friedland in East Prussia

termed 'shingle marl.' Marl is a clay containing carbonate of lime.

The placing of interior gravel or sand drainage, as was done at Friedland, is difficult of accomplishment and tends to retard progress of construction. This method of drainage is not used very extensively in American dams.

In experimenting with clay to be used in the cutoff of the South Haiwee dam of the Los Angeles, Calif., water supply previous to 1912, it was found that practically no percolation occurred through a diaphragm of the clay 1 in. thick under a head of 100 ft. The cutoff was constructed by placing it in water in a trench about 8 ft. wide; it has a maximum depth of 120 ft. below the valley floor.

So far as the writer is aware, Niederwartha is of record height for an earth dam having its clay waterstop on the upstream face, and it quite exceeds any American dam of the same type.

Experience in Cleaning Irrigation Ditches by Machine

Montana project cleans 100 to 115 miles per year without stopping operation, at cost of less than $100 per mile

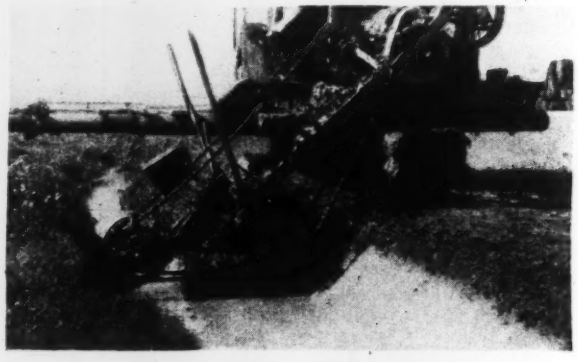
By GEORGE EBNER
Operation Engineer, Valier-Montana Land & Water Co., Valier, Mont.

COST of cleaning irrigation canals of the Valier irrigation project indicates a range for one-way cleaning by machine during the past three years of from $92 to $95 per mile including depreciation charge. The following information may be compared in some details with similar work in the Imperial Valley reported in *Engineering News-Record*, Sept. 25, 1930, p. 501, where 3,000 miles per year are cleaned under quite different conditions (the silt there is deposited from the irrigation water).

The Valier project consists of 80,000 acres located in north-central Montana. It was built under a Carey Act contract, which called for delivery of water within one-half mile of each 40-acre subdivision and 460 miles of canal were constructed between 1912 and 1918. Canal maintenance has never been a serious problem, as the creek water entering the system carries no sediment and the canal grades were fairly well controlled. The silt cleaning was increased, however, by reason of wind-blown earth from summer-fallowed fields.

Canal cleaning was done through 1927 by means of teams. This work was hampered by the short spring and fall period during which the canals were dry for this work. In addition, team cleaning costs were becoming prohibitive due to the expense of building up a large force for a short season, increase in wages, maintenance of teams during the long idle period and cost of maintaining camps.

An analysis of the 460 miles of canal showed that 58 miles of the larger diversion and distribution canals did not need cleaning. There were 6 miles of structures, chutes, flumes and drops, 7 miles of coulee ditch with fast grade, 10 miles too small to bother with machine cleaning and 26 miles too remote and scattered. This left 359 miles of canal to be cleaned. It was estimated that, at the most, cleaning every three years would be necessary. In March, 1928, a dredger was purchased. The machine came equipped with crawler traction, self-dumping buckets and adjustable double-pipe axles that permitted a maximum spread of 36 ft. A lighting plant wsa added for night operation. As cleaning had been deferred and haste was necessary, the machine was operated double shift (20 hours per day) during the seasons of 1928, 1929 and until August, 1930, when it was cut to a single shift. It is expected that hereafter the system can be kept in good condition with continuous single-shift operation. The following table shows the milage, rate and cost of cleaning:



Steep slopes retard future growth of vegetation
Excavator spans ditch with adjustable double-pipe axles. Capacity is 20 cu.ft. per second.

	1928	1929	1930
Miles, canal cleaned	86.0	106.0	102.0
Miles, one-way cleaning	109.0	123.2	114.6
No. ten-hour shifts	290	284	208
Miles cleaned per shift	0.38	0.43	0.55
Cost Per Mile			
Labor	$40.55	$40.53	$38.51
Auto expense	3.82	4.22	4.04
Gas and oil	15.06	11.53	10.38
Repairs and materials	11.90	11.98	15.67

Depreciation, $250 per month equals $23.70 per mile.

Under the varying ditch conditions and the vegetation (willows, sweet clover and tule) it is felt that an accurate yardage figure could not be secured, but by timing the buckets at various places it was estimated that the costs per yard were around 6c. Two men were required for each shift. The fact that the milage per shift increased each year is due to the wider experience of the men; the same crews were held through the three years. It is felt that it was economical to hire good men, and the operator was paid 80c. per hour and the helper 57c. Gasoline costing 19 to 20c. per gallon was used for motor fuel. In some situations auto expense for transporting men to and from work might be eliminated, but such transportation was cheaper than maintaining the men in camps.

Repairs were not stinted, and the dredge is still in good operating condition. As compared with teams, the machine has the advantage of working through the entire season without any interference whatever with water deliveries. It leaves a smooth ditch section. Canals were originally built with 1½ to 1 side slopes, but it was found from the 1928 cleaning that the growth of vegetation is retarded by the steeper slopes left by the dredge buckets. In many cases smaller ditches were enlarged. In general, the system is kept in better condition than formerly, and the water delivery service has been improved.

Some Recent Points in Engineering Law

REVIEWED by HERBERT BRAASCH
Attorney at Law

DECISIONS reached in cases tried in the higher federal courts and in the state supreme courts are summarized in these articles appearing from time to time in *Engineering News-Record*. —EDITOR.

Contractor's Liability on Improper Design

On a contract for laying sewer mains in the city of Los Angeles the work was to be in accordance with design and studies made by the city engineer and was awarded to Tomich. Because of improper planning and location of sewer line and the contractor's effort to execute work inherently dangerous and wrong in design, the retaining wall and building foundations of an abutting property owner gave way.

The property owner joined both the contractor and the city in an action for damages. Both were held liable and the owner was permitted to recover his damage from either. The contractor was liable for undertaking such work, although execution was in the customary manner, with all the care contemplated by design or contract.—*Kaufman vs. Tomich, California.*

Trespassing Children

Roofers brought to a job a tar-melting vat mounted on two wheels. The axle supported a platform that extended to the rear of the vat and formed a step upon which workmen could stand to stir and dip tar. The vat was equipped with a tongue so it could be used as a trailer. The workmen on leaving the job in the evening placed the tongue on a sand pile, so that the vat was about level. It was left in the street near the curb with the tar in a molten state. Thereafter, children aged 7 to 11 congregated and played in the sand pile and one of the children stepped on the rear of the platform. His weight overbalanced the trailer and the child was burned to death by the hot tar.

Parents of the child sued the roofing contractor, claiming an owner of machinery or appliances is liable for damages when such devices are dangerous and attractive to young children and there is failure to use ordinary care in guarding against injury. The contractor's position was that the child was a trespasser and if it had not meddled with this property the injury would not have occurred—that there is no duty to make one's property a safe playground for children.

A child of immature years is expected to exercise only such care and self-restraint as belongs to childhood, and an adult person is presumed to know this and govern his action accordingly, so if the accident could reasonably have been anticipated the contractor's workmen were negligent. There is liability on the part of a person who places a dangerous contrivance in a place frequented by children while knowing or having reason to believe children will be attracted and allured to it and subjected to injury. The contrivance, however, must be artificial and uncommon as well as dangerous and must be capable of being made safe with ease and without having its usefulness destroyed.

Damages were allowed against the contractor, it being found that the vat was uncommon and not usually met with by children in their play, and that the vat could easily have been placed in a stable position by wheeling it to the curb in such a position that the curb engaged the platform—all this without destroying its usefulness. —*Morse vs. Douglas, California.*

Eight-Hour Clause in Public Works

A Maryland statute defined a working day for laborers and mechanics employed by the city of Baltimore as eight hours and set a minimum wage of $2 per day. On public work the contractor or subcontractor could not require or permit a longer working day than eight hours (except in emergencies) and was required to pay not less than the current labor rate in the locality where the construction took place (a straight rate for emergency overtime). A fine for violation was provided.

In a sewer-extension contract the International Union of Operating Engineers, which had no agreement with the contractor, sought a court order enjoining the contractor from working extra hours, as he was doing. Attack upon the constitutionality of the law failing, the contractor challenged the right of the union to interfere, citing the principle that private citizens or organizations cannot restrain public wrongs unless they prove a damage to themselves that is different in character from that sustained by the public generally.

Neither the union nor any of its members was a party to any of the city contracts (no member of the union having been employed in any of the work), and there was no invasion of any private rights further than that members of the union were taxpayers of the city of Baltimore.

Such taxpayer has a special interest where the wrong alleges an increase in the burden of taxation; but there was no monetary loss to the taxpayer through the contractor's failure to live up to the hours-of-labor requirements.

Failure of the contractor to abide by the provision of the act is a crime; and criminal prosecution, not a civil suit, is the remedy. The civil court will not assume and exercise a vigilant and constant supervision of the hours of labor of persons engaged in this work.—*Ruark vs. International Union of Operating Engineers, Maryland.*

Claims Allowable Against Surety Bond

Surety bond was given on certain highway construction. Such bonds not only guarantee the contractor's faithful performance to the state, county or municipality making the award but also protect persons who furnish labor, materials and supplies consumed in the construction. In this respect it is similar to a mechanic's lien on private work, there being no lien against the public body. Not all bills due from the contractor are covered by such bonds but only claims for labor, construction materials such as lumber or cement, and some secondary supplies.

The Minnesota statute under which act this bond was required extended coverage beyond the scope of such bonds in other states and provided protection to persons "furnishing skill, tools, machinery, materials or insurance premiums." This provision extended coverage to items of contractor's permanent plant and general equipment.

Under this provision George A. Clinton claimed for the value of labor and materials furnished to a subcontractor. The claim comprised truck repairs and replacements of bearings, pistons, drive shafts, cylinder blocks, batteries and tires. Repairs were made during the progress of work, but there was no proof that parts

supplied or replaced were worn out entirely on that job.

The court rejected a literal reading of the act. It is clear that sureties on a small contract were not intended to be liable for the cost of a steam-shovel outfit at an outlay possibly greater than the contractor bid for the work; nor was there an intention to permit a contractor with run-down outfit to have it rebuilt at the expense of sureties. Unless equipment is of a kind that is to be used only on the job in question and is wholly consumed thereon to the extent that there is no residual use or value except as salvage, the purchase price cannot be claimed from the surety even in Minnesota. But repair work minor in cost—in other words, wear-and-tear replacement—is covered by the bond. Spark plugs, grease cups, bolts, etc., would be included; tires might or might not, depending upon whether they were completely consumed on the contract. Items resulting from accident are not "wear-and-tear," and the cost of raising a sunken dredge could not be recovered. The court excluded all recovery, except where the parts furnished were shown to have been worn out on the work in question.

The act also extended the bond coverage to include "equipment or supplies for any camp maintained for the feeding of men and animals engaged under or for the purpose of such contract." The commissary expenses of a construction camp, the grain and hay bills, or stable expense, and the wages and other expense of maintaining a repair shop in connection with construction were all held properly covered in the bong by the court.—*Geo. A. Clifton et al. vs. National Surety Co., Minnesota.*

Restrictions Imposing Setbacks From Lot Line

A building restriction contained a provision that "premises shall not be occupied by a colored person, nor for the purpose of doing a liquor business thereon, and all buildings shall be placed at least 15 ft. back of the front line of lots."

The structure complained of was used as a lumber yard. The principal building was properly set back, but a 10-ft. tight board fence in front and 6-ft. fences on the sides inclosed the lot to the street line. The inclosure was used for storage of lumber and shingles but was without roof.

The purpose of the restriction, it was held, was not to control the kind of buildings but to govern their location in order to afford adjoining owners light, air and view. The fences were attached to the building, and the inclosure used as an integral part of it, and the structure defeated the restriction as effectively as though the inclosure had been fully roofed.—*Bagiano vs. Harrow, Michigan.*

Fire Danger in Course of Construction

A plumbing contract was let by the owner of a structure that was being erected. The "roughing in" was well under way when fire destroyed the project. In their agreement the parties made no provision placing risk of loss on one party or the other, as they might have done. Neither party had caused the fire through negligence or otherwise, so that matter could not be disposed of by placing loss upon the negligent party.

The owner refused to make any payment to the contractor on the defense that the contract called for a completed plumbing job, which he did not get. The court, admitting that this defense was good in many states, held it was not good in Minnesota. There such a contract is founded upon an implied condition—the assumed continued existence of the building—and the contractor may recover the reasonable value of work destroyed but not the contract price.

The owner then sought to escape liability because the contractor had no plumbing license under the city ordinance. The court construed this ordinance as relating to the fitness of men engaged in the trade, its purpose being to have the work done in a safe and sanitary manner. It does not prevent persons who are not plumbers from contracting for the work and engaging licensed plumbers to do it, as had been done in this case.—*Robi et al. vs. Parten, Minnesota.*

Purchases by Contractor as Owner's Agent

Bayley & Co. did certain construction work for the owner of property under a contract in which the contractors were to proceed with the job as agents of the owner on a "time-materials" or "cost-plus" basis. The order on which supplies were bought contained a provision, "Liability—This order is a direct obligation upon Mr. H. J. Dynes [the owner]."

A material man whose bill had not been paid brought an action against the contractors who had made the purchase, to which the contractors replied by citing the terms of the order. The material man then admitted there was no personal liability on the part of the contractors because of his purchase as an agent but that the owner had in fact given the contractors money for the purpose of paying off subcontractors and other creditors. Then the contractors objected that all this was not material to the case because the material man was not a party to the contract or dealings between the owner and his agents. The court held the material man was entitled to payment from the contractors. While it is true the material man was no party to the construction contract, the law implies a promise on the part of any person who has received the money due to another to pay that other person on demand.—*Carmichael Title Co. vs. C. A. D. Bayley & Co., Georgia.*

Steel Ties in England

The use of modern steel ties on English railways, which was begun a few years ago as a measure of relief to the severe depression in the domestic steel industry (*ENR*, March 7, 1929, p. 390), appears to have proved sufficiently satisfactory to warrant additional trial. Of the four railway systems the Great Western Railway is to lay 62,000 steel ties this year, which with 136,000 ties already in use will make an aggregate of about 94 miles of track. As they are still regarded as experimental, they are laid in stretches of about a mile each on various parts of the system. The Southern Railway had 65,200 steel ties in use at the end of 1930 and will lay 58,750 (5,000 tons) this year, making a total of 123,930 ties, or about 85 miles. The London, Midland & Scottish Railway has about 82,000 ties of different designs, and this year it will lay small quantities of two other designs for experimental purposes. The London & Northeastern Railway has relatively few—about 1,000 steel ties. These ties are of different designs but are all of the inverted-trough type and for bull-head or double-head rails. They weigh 170 to 190 lb. each, exclusive of tieplates or fastenings.

Pile and Timber-Deck Bridging Covers Sunken Concrete Road

2½ miles of settled paving through North Carolina swamp replaced by low bridge

By W. L. CRAVEN
Bridge Engineer, State Highway Commission, Raleigh, N. C.

SEVERE swamp conditions encountered on a section of one of the main routes of the North Carolina state highway system have required the recent construction of 2½ miles of specially designed pile and timber-deck bridging to replace a 16-ft. concrete road built in 1923 that had become impassable a considerable part of the year on account of settlement and subsequent flooding during certain high-tide conditions. The project is located on a narrow swampy peninsula in the extreme northeastern part of the state not far from the ocean and adjacent to the Great Dismal Swamp. The concrete road was 1 ft. above the normal water level in the nearby Pasquotank River. The latter is not affected by floodwaters, but certain combinations of wind and tide that occur four or five times a year raise its stage an average of 6 in., with extremes of 36 in.

To provide a base for the 16-ft. concrete slab, a corduroy of logs was laid on the swampy ground crossed by the road. At the time the original work was done it was expected that the broad heavy corduroy would float the concrete slab and the traffic carried by the latter. But the weight and vibration of traffic caused the concrete to sink irregularly into the oozy mud. As a result water stood over parts of the road several weeks at a time, stretches often being impassable for several days.

After careful study and experiment the decision was made to build a creosoted pile and timber bridge directly over the concrete road. One of the chief reasons for this policy was the impracticability of delivering the piles and timber to any new location isolated from such transportation facilities as the old road afforded. There were no parallel routes over which traffic could be diverted; hence the bridge had to be built in short sections and temporary bridging erected alongside as a detour.

In order to reduce interruptions to traffic to a minimum on the old road during the several months that the work had to be under way, a bridge design was adopted that embraces two rows of piles, spaced 18 ft. on centers, along the two edges of the concrete slab. The piles are placed 10 ft. on centers, thus making comparatively short spans. The design avoided a row of piles down the center of the old road, which would have blocked traffic on the latter.

Untreated pine piles averaging more than 65 ft. in length, with a minimum of 50 ft. and a maximum of 80 ft., were driven. A pair of 75-ft. leads equipped with a steam hammer was moved down one side of the concrete slab to drive the piles on that edge. Then it was shifted across to drive the other row. With one side of the base of the driver resting on the edge of the concrete and the other on a mat of logs in the swamp, sufficient stability was obtained. It was still possible to leave a minimum of 13 ft. of the old road open for traffic.

The design called for a bearing of fifteen tons per pile, based on the *Engineering News* formula. A test pile, driven before the work was started and loaded to four times the required carrying capacity, stood for several months without settlement. While driving was in progress the hammer was rested on the last pile driven each day until driving was resumed. In every case the skin friction developed an increase of 100 per cent or more over the computed bearing on the previous day. Several blows also had to be struck before the pile could be broken loose.

Fig. 1—Timber bridging on piles over sunken concrete road, North Carolina

Details of the structure are shown in Fig. 2. After the tops of the piles were cut off 8 in. below the top of the concrete cap placed on each of them, a ⅝-in. drift pin was driven into the head of each pile. This drift pin was threaded and of sufficient length to engage the 14x16-in. timber cap resting on the concrete incasing the pile heads. With the piles in place and the drift pins driven, a hole about 3 ft. in diameter and 3 ft. deep was dug around the pile head. A 30-in. section of plain concrete pipe, 18 in. in diameter and belled at the upper end, was then placed in the hole, centering on the pile head, to serve as a form for the concrete-pile cap.

To facilitate shoring up each pipe-section for accurately to line and grade, a circular iron band cut in two equal parts was placed around the pipe immediately under the bell. The two pieces of the band were fastened together with bolts, using keys instead of nuts to simplify dismantling. In assembling each band the two bolts holding it together were each slipped through an eye on the end of an 18-in. bolt. The other end of the latter was threaded for 6 in. to allow range for a nut on that end. The 18-in. bolt also was bent near to eye so that it would clear the bell and still be parallel to the center line of the pipe.

The two eyebolts on each pipe section were passed

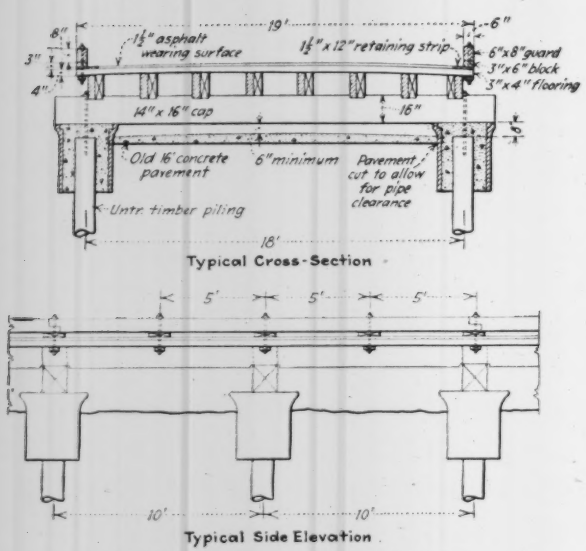


Fig. 2—Details of bridge structure

between a pair of horizontal 2x4-in. pieces 5 ft. long, shored up on pile butts and blocks to give the right elevation for the top of the pipe section. With the threaded ends of the eyebolts and a large washer bearing on the pair of 2x4's, the pipe section could be raised and lowered as desired. When set right the hole was backfilled with dirt to hold the pipe true to line and grade. The water was then pumped from the hole, the head of the pile carefully washed clean and the pipe form filled with 1 : 2 : 4 concrete.

As soon as the form was filled the top of the concrete was troweled smooth and then rubbed down to an accurate surface to provide a good bearing for the timber cap that rests on it. An average of forty of the pipe forms were filled and finished in a working day with a crew of six men.

The top of the finished concrete-pile cap is 8 in. above the head of the pine pile. Since the groundwater level of the swamp is always higher than the bottom of the concrete-pipe form of the cap, the top 3 ft. of the timber pile will never be exposed. The permanency of the footing of the structure is thus considered assured.

After the piles had been driven and capped for some distance ahead, the bridging was started. This work was done in sections about 800 ft. long, with a single-track temporary timber bridge serving as a detour around that distance. The temporary structure was built on a mat of small logs placed 30 in. on centers at right angles to the center line of the road. On top of these logs four 3x8-in. gum stringers 16 ft. long were laid so that the wheels of traffic would track between the pairs of them. The decking consisted of 2-in. gum and oak plank in 12-ft. lengths. Along both edges of the decking a line of 2x4-in. wheel guards was securely nailed down. Two widened sections to allow vehicles to pass were built in each detour.

Building the Deck

The creosoted timber and lumber used in the decking were delivered from rail sidings in trucks over the old road. When the material for an 800-ft. section was thus located, traffic was diverted to the detour and setting of the cap sills begun. All the equipment used in handling the decking was mounted on a 3-ton motor truck. A compressor on this truck furnished the air to operate hand tools for boring holes and driving spikes and nails. A 2-ton hand-operated chain hoist hung from a light steel frame cantilevered out from the rear end of the truck was employed very effectively in shifting the heavy timbers.

After enough sills were set to make room for a crew placing stringers, work on the latter was started. Then behind them came a third crew lining and nailing the stringers. Following them was a fourth crew placing decking. When the sill and stringer crews were done they helped set decking. After all of the decking for an 800-ft. section was in place, four crews of five men each, equipped with 28-oz. air hammers, nailed it down. Each piece of decking was fastened with fifteen 60-penny nails, eight to toenail it to the stringer and seven to be driven straight back to the preceding piece of decking. One crew of five men could nail from 115 to 125 lin.ft. of decking in a day. The usual time required to complete one of the 800-ft. sections was from 3½ to 4 days.

As soon as all of the decking was finished, a temporary 6x8-in. timber wheelguard was toenailed along its

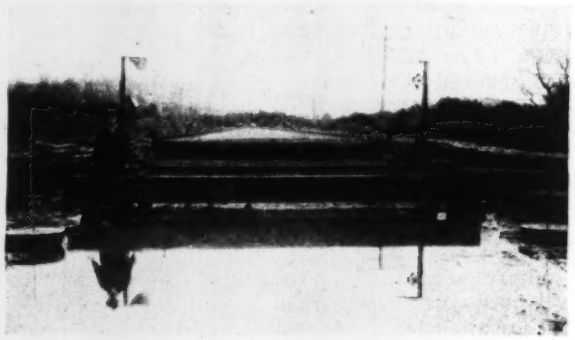


Fig. 3—Flooded roadway and bridging under construction
Note planked detour at extreme right.

edge. The detour was then torn up and shifted ahead to the following section of the job, requiring about two days. Most of the material for the temporary detour bridge, except the logs, was used repeatedly with very little replacement necessary. When four of the 800-ft. bridge sections were finished, the permanent guard rail shown in the accompanying sketch was built. A crew of eight men using air tools would complete about 1,000 lin.ft. of this rail in a day.

After the timber work was done, a wearing surface of 1½ in. of cold-laid asphaltic concrete was placed on the decking. This surfacing was laid in half widths, in order to permit traffic to continue to move over the structure. The material was dumped in place by 1½-yd. trucks, raked smooth by hand and finished with a 6-ton roller. When a half-width strip 800 ft. long was completed, traffic was turned over it and the other half done. With four trucks serving a crew of twenty men the material for 1,600 sq.yd. of surfacing could be unloaded, delivered and finished in a day, the haul averaging about 3 miles.

The project was designed and built by the North Carolina state highway commission, of which John D. Waldrop is highway engineer; W. L. Craven, bridge engineer; and C. B. Taylor, bridge maintenance and construction engineer. F. D. Summers was in direct charge of the work for the first half of the job, with W. K. Norman as his assistant, the latter being in charge for the rest of the time.

Demolition of Trainshed at South Station, Boston

By JOHN C. MOSES
Chief Engineer, Boston Bridge Works, Cambridge, Mass.

REMOVAL of the huge trainshed at Boston's South Station last fall was one of the basic operations in an extensive program of improvements begun by the Boston Terminal Co. and now virtually completed. The demolition work was carried out without interfering with traffic on the 28 tracks beneath the shed and involved removing 8 acres of tar and gravel roofing, 70,000 sq.ft. of window glass, 1,000,000 ft. of lumber and 4,000 tons of steel.

Built in 1898, the shed was graceful in appearance and economical of material and has always been successful in its purpose except for one enemy, rust. The combination of salt water, fogs and engine smoke, the latter aggravated by the use of coke, caused so much damage to the steel that in 1920 it was necessary to repair or replace many of the light trusses, purlins and rafters.

The new program of improvement included complete removal of the shed, relocating the tracks and platforms and erecting separate canopies over each platform. Work on the platform tracks and canopies was well along toward completion before removal of the trainshed started. The following requirements had to be met in removing the trainshed: safety first for the patrons and employees of the railroad on the platforms and in the trains; no delays to trains and the least possible interference with their customary movements; a time limit of 100 working days; no work allowed during rush hours; demolition equipment must entirely clear the new canopies, give 22 ft. headroom for the trains and permanently occupy not more than two tracks.

Layout of Steel—The roofing material was stripped off by hand labor during night hours and loaded into cars on the tracks below. The main problem, of course, was the removal of the steel. There were ten bays 60 ft. long lengthwise of the building with three spans transversely, each side span being 169 ft. and the center span 128 ft. between columns (Fig. 3). The side-spans cantilevered over the interior columns and carried a suspended span 150 ft. long weighing about 25 tons. At each end of the building the space between the columns was filled by trusses, much deeper and heavier than the interior trusses, as the ends of the building were filled with windows and the truss members were beams to carry wind pressure. Sixty-foot purlin trusses 20 ft. apart carried I-beams and rafters spaced 7½ ft. apart. The bottom chords of the end trusses were braced by horizontal wind trusses.

The contractor's previous experience with this trainshed in the repair work of 1920 made him doubt the safety of placing any loads on the roof, and it was decided to build travelers that could reach and remove all the steel from below. Two travelers were built, 80x48 ft. and 80x36 ft. in plan, made up of steel trusses supported by wood towers mounted on flanged wheels to fit the

Fig. 1—Replacing old trainshed with canopied platforms, South Station, Boston

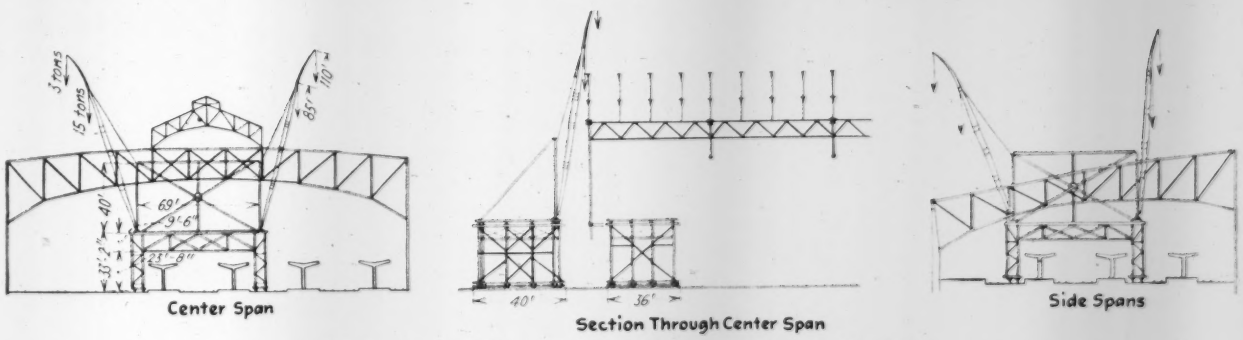


Fig. 2—Traveling platforms providing clearance beneath for train movements were used in demolition of South Station trainshed

From a paper presented by the author before the Northeastern Section of the American Society of Civil Engineers.

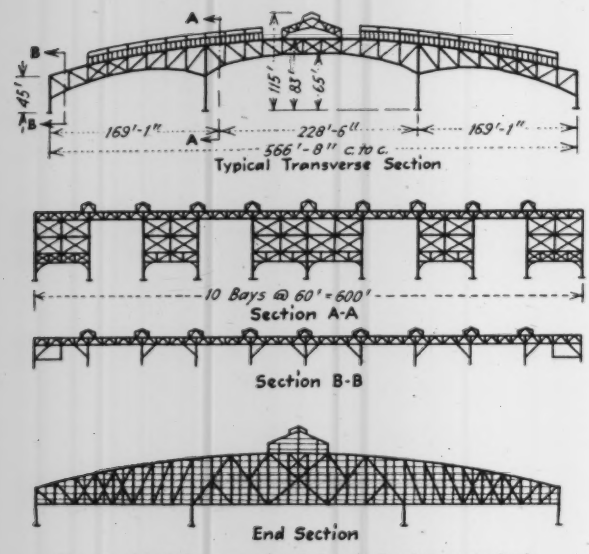


Fig. 3—Steel framework of South Station trainshed

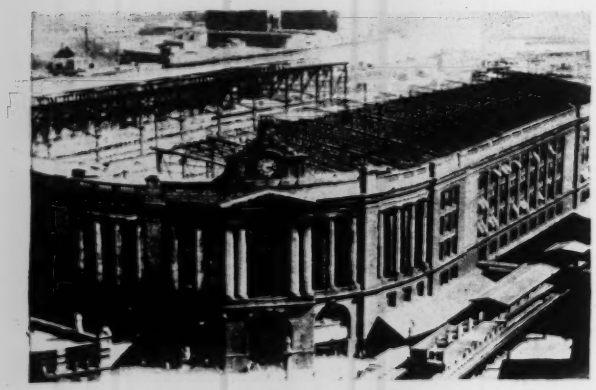


Fig. 4—Center section of old trainshed has been removed

rails. These travelers provided two platforms 33 ft. above the track and were connected tandem during most of the operations to provide a platform of about 80x100 ft. The larger traveler carried two 15-ton stiff-leg derricks.

Great care had to be exercised in removing the large amount of light material so as not to destroy the stability of the main trusses and columns. The center suspension span was lowered in a single piece by the two derricks working together. The side spans were shored up on the small traveler and then cut into sections that could be handled with a single boom. Each piece of steel handled was first made fast to the boom falls, cut free with a torch and then lowered to the deck of the smaller traveler, where it was cut into pieces suitable for loading on cars. The tracks under and alongside the travelers were used by trains most of the time so that material was accumulated on this traveler until cars could be put on the tracks for loading. This accumulation often amounted to as much as 100 tons. During the demolition work the sharp edges of the rusted material soon cut the wire rope slings and made frequent renewal necessary. Also, flames from the cutting torches often set fire to the wood spiking pieces, and lines of hose and fire extinguishers had to be kept ready at all times.

At the beginning of the operation the travelers were first set up outside the shed in the center and moved toward the head house until all the center portion was taken out. The travelers were then shifted over to the side span and worked away from the head house. The operation was repeated on the other side span, with the travelers again working toward the head house. One of the most spectacular elements of the job was involved in moving the travelers sideways across the trainshed from the center to the side span and from one side span to the other. Lines of rails were laid transversely across the tracks and platforms, the wheels were turned 90 deg. and the travelers moved by means of lines from a derrick car. Parts of the new canopy that came in the way were removed by the derrick car. Moving the travelers across the 28 tracks required a continuous operation of 48 hours.

The outcome of the work was satisfactory to all concerned. Not one passenger was injured and only nine claims were made for burned clothing aggregating less than $500. No damage was caused to the 50,000 trains that used the station. The methods adopted for doing the work were devised by the contractor, the Boston Bridge Works.

Grouting Cracks Restores 30-Year-Old Dam on Merced River

By HAROLD K. FOX
Construction Engineer, San Joaquin Light & Power Corp.

EXTENSIVE grouting operations were used recently to repair the badly cracked and porous portions of a 30-year-old gravity concrete dam on the Merced River, Calif. The serious condition of the structure, which is a part of a small hydro-electric development, was revealed as a result of a program of modernization by the San Joaquin Light & Power Corp., the purchaser of this project in 1910. The grouting proved effective in restoring the condition of the structure and improving much of the original concrete work.

Preliminary studies on a plan to improve the project indicated that the area of the reservoir site would permit raising the water level 6 ft., which made the old dam an important factor in the reconstruction program. The structure was of simple gravity type, and from external appearances it appeared in fairly good condition without indication of serious leaks or signs of weakness. It had been used with 4-ft. flashboards and, in addition, heavy floods had passed over the crest.

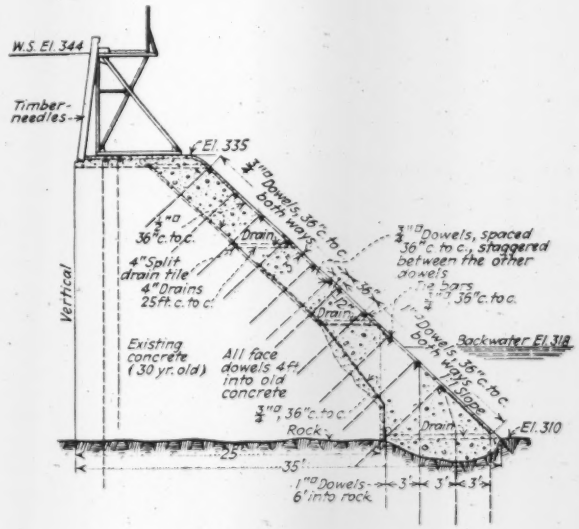
Original plans and specifications were not available, and since the reservoir was full, inspection of the upstream face was impossible. The inferior quality of the concrete was rather apparent, but the extent of the cracks, the serious porosity and the amount of saturation were not revealed until reconstruction work began.

The new plan involved constructing a 4-ft. slab on the downstream face, doweled to the original structure. This new section of concrete was to extend into the foundation rock for a downstream cutoff and up over the original crest to provide a foundation for the new needle-gate superstructure. This plan utilized the old concrete as mass only, and the joint between the two sections was equipped with an extensive drainage system.

Reconstruction began with the excavation of a trench along the downstream toe to form the cutoff and foundation for the new concrete slab. This trenching necessitated the removal of some of the old concrete, revealing the true condition of the original structure as well as the fact that it had been placed directly on river rock without any attempt to improve the contact surface. The foundation rock is a very poor slate.

Further exploration into the old mass of concrete indicated that it was heavily saturated and contained pockets of extremely porous concrete. The material in these pockets was removed, while drilling of 4-ft. holes was begun for the dowel system on the crest and downstream face. The drilling of these holes not only confirmed the other discovery regarding the poor condition of the structure but gave additional evidence as to the amount of saturation, since many of them flowed full of water and some actually indicated pressure.

As a result of this work the following conclusions were drawn regarding the condition of the old dam: The



Section showing doweling of new concrete

concrete was deficient in mortar and an excess of "plums" had been used. Construction joints apparently had not been cleaned and subsequently had been enlarged by the dissolving effect of the water. Evidently serious leakage had occurred on completion of the original structure, and as a corrective measure the downstream face had been plastered with cement mortar. This had proved quite successful under the existing low head and had resulted in concealing the true condition of the structure. Although the old structure had served successfully for many years, it could not be considered safe for a 6-ft. increase in head without extensive improvements.

Complete removal would involve more expense than the project could stand economically, and restoration by extensive grouting was the alternative used. Vertical holes were drilled from the crest of the structure into foundation rock to permit sealing of the foundation contact as well as of the construction joints. Other holes were drilled at right angles to the downstream face and horizontally along the foundation contact line. About a 50-ft. length of the dam was drilled in this manner before the work of grouting was commenced. Upon application of compressed air, muddy water flowed from most of the holes and in many cases spouted several feet into the air. One hole in particular, 50 ft. away from the point of application, spouted water.

The absence of leakage prior to drilling can be explained by the fact that the cracks or joints were sealed with mud that was unable to flow through and out the downstream surface because of the plaster coating. To clean out the mud accumulation in the joints and cracks, air and water were forced into the holes until indications of mud disappeared, indicating that the surfaces had been cleaned for the grout. This work was particularly difficult because additional mud flowed in from the silt accumulated on the upstream face, and operating conditions did not permit lowering of the reservoir level.

To prevent grout from escaping, it was necessary to plug many of the holes and calk the crack with rags. Even with these precautions much of the grout was wasted, particularly on the upstream face, where it escaped and bubbled up through the mud and water. To correct this difficulty, low pressures and thick grout were used at first. Several holes in a section were treated in this manner first and the grout was allowed to set. Following this preliminary grouting, a higher pressure and a thinner grout were used. Additional holes were required by this method, and the work was much more extensive, but eventually all the leaks were closed off.

The equipment and methods were those common to ordinary grouting practice and a maximum air pressure of 100 lb. was used. The grout was mixed in proportion of 1 cement to 2 sand and water, to fit the particular

Downstream face during reconstruction

Section of new concrete in background. Note extensive doweling. Pockets excavated in old concrete resulted from removing very poor disintegrated material.

General view before repair

Old flashboards have been removed.

condition. In many cases final closure of the leaks was effected with pure cement grout. A total of 3,722 sacks of cement was used in grouting the 5,000 cu.yd. of concrete in the dam, or approximately three-quarters of a sack per cubic yard.

Following grouting, some portions of the structure were removed, and it was found that the grout not only had entered the cracks in the structure but also had been forced into the voids in a concrete itself. The resulting concrete was of a light color and when struck produced a ring more like good concrete than the original material.

Reconstruction of the dam permitted the economic installation of a new 4,000-kva. generator driven by a propeller-type turbine. This unit has no governor but is operated by a system of remote controls that maintain constant pond level by adjusting the wicket-gate openings and simultaneously adjust the angle of the turbine blades for best efficiency. In addition, the plant is of interest because it is semi-automatic and the first installation of the outdoor type made in California.

The work was done by the construction department of the San Joaquin Light & Power Corp., under the writer's supervision.

Segregated Concrete Removed in Repairing Old Multiple Arch

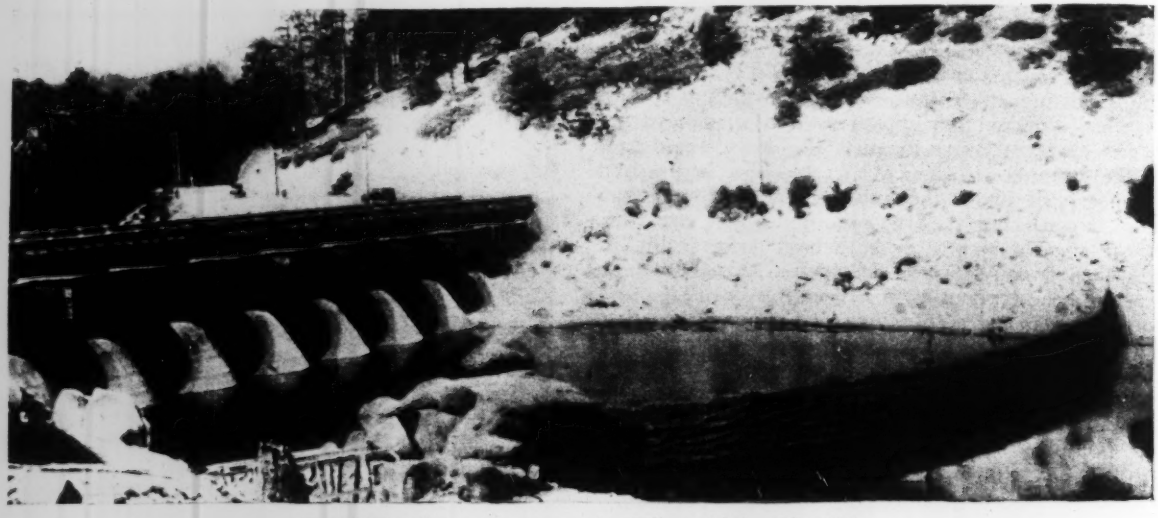
DISCOVERY of concrete segregation in horizontal seams resulted in extensive repair work on two arches of the twenty-year-old Bear Valley multiple arch dam near Redlands, Calif. During the repair operations the famous original Bear Valley masonry arch dam built in 1884, which is about 150 ft. upstream, was pressed into use temporarily to permit work on the base of the arches. The repair work on the two arches, involving removal of the segregated concrete and replacement with gunite, is reported to have been effective in eliminating all evidence of leakage and putting the arches in good condition.

With the object of stopping a small leak that probably had existed since the dam was built in 1911, repair work was undertaken near the base of arches Nos. 3 and 4 late in the fall of 1930. The upstream faces of the arches were originally poured against corrugated steel sheets set against the outside of angle iron ribs. Following the pouring of the concrete arches, at the time of construction in 1911, these steel forms were left in place and covered with cement plaster. After twenty years this plaster appeared in good condition, but it was necessary to remove it and the corrugated steel to locate the path of the leakage.

This work led to the discovery of the segregated material in the concrete deposited under the sloping forms. The segregation appeared in more or less horizontal seams and, in places, contained only the crushed rock aggregate of the original mix. Exploration in these seams showed that some of them extended nearly through the arch, which was approximately 20 in. thick at that location.

Because of the lateness of the season and the possibility of interruption by weather conditions at the 6,750-ft. altitude, it was necessary to complete repair operations in the shortest possible time. The seams of porous and segregated concrete were removed by air chisels, and the exposed portions of the angle iron ribs and adjacent concrete surface were cleaned with a sandblast. Following this preparation, square mesh reinforcing was placed in the seams and spread over the entire surface of the arches where the sheet metal had been removed. Filling of the seams followed, a 1-to-4 mixture of gunite being used; this material was built up 3 in. thick over the entire surface. In addition, a 2-in. layer of gunite was placed on the downstream side of the arches from bedrock to a height of about 10 ft. after the surface had been thoroughly sandblasted.

Within less than 30 days after the beginning of repairs the work was completed and water again placed against the new dam. Inspection of this work following the replacement of the structure in service showed the repairs effective in stopping the leakage. Close examination of the remaining arches during the winter, including drilling at numerous places, indicated no similar trouble except

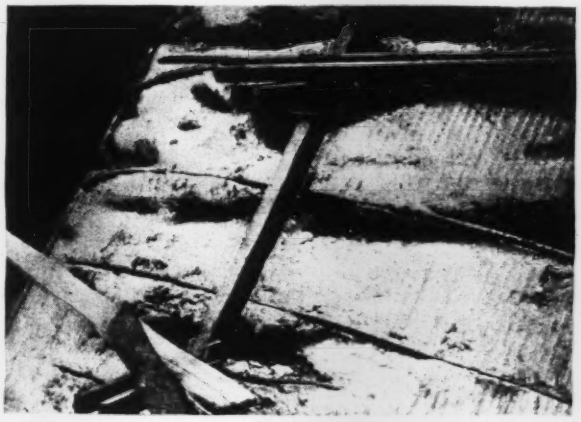


Bear Valley dams—masonry arch, 1884; multiple arch, 1911

The old masonry arch of well-laid granite ashlar is famous because of its slender proportions. The crest is about 300 ft. long with a 335-ft. radius, and the maximum height is 64 ft.

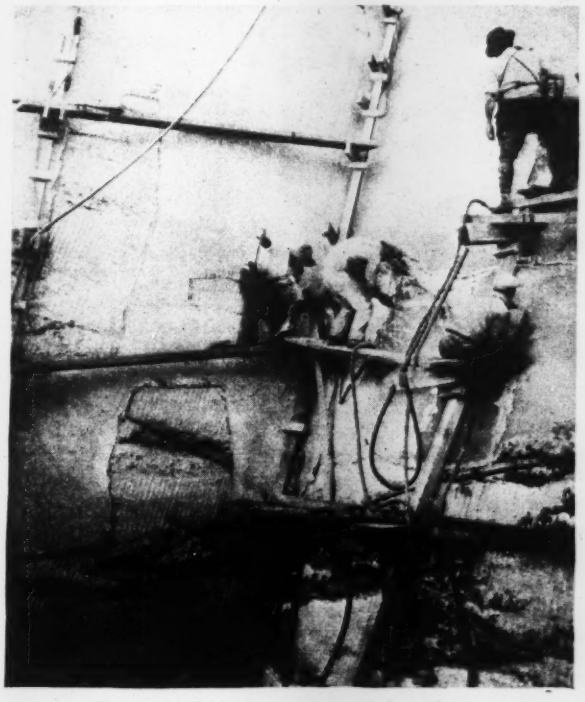
in the most southerly arch. In May this arch was repaired in the same manner.

The trouble seems to have occurred where steady leakage and seepage persisted. Where dry stone pockets were formed in the other arches, they were not extensive. There are indications, according to observers, that the trouble was confined almost entirely to places where water containing organic matter worked through from bedrock seams at the dam contact and possibly from lake water getting in at the bottom of the arches. Sections nearest the base or the abutments were most affected.



Segregated concrete removed from horizontal fill-planes

Some seams extended almost through the 20-in. thickness of arch. Crevices were refilled with gunite.



Removal of plaster coat revealed weakness

The plaster covers the corrugated sheet steel forms that were left in place after the concrete for the arches had been deposited behind them.

Tests of arch concrete specimens taken from points close to defective streaks showed excellent compressive strength.

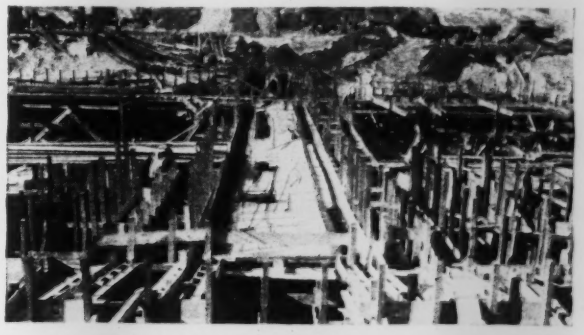
No leakage resulted from the six months' test of the first repair work in winter weather, and it is believed that the strengthened arches now are in good condition.

The repair work was in charge of Jeffry Prendergast, president of the Bear Valley Mutual Water Co., owner of the structure. The repair work was done by the California Gunite Construction Co., of Los Angeles.

Providence Building 52,000,000-Gal. Activated-Sludge Plant

GOOD PROGRESS is being made on the construction of a 52,000,000-gal. activated-sludge plant for the city of Providence, R. I., making use as far as may be of the old chemical precipitation plant. All the tanks and buildings of the precipitation works are being remodeled while sewage treatment is being carried on.

When the new plant is completed, sewage will first pass through two mechanically cleaned bar screens with



Screen chamber and detritors of Providence activated-sludge plant under construction

$\frac{3}{4}$-in. openings. It will then go through two detritors, two primary settling tanks, eighteen spiral-flow aeration tanks and five final settling tanks. All the settling tanks will be equipped with revolving sludge scrapers. The effluent will be chlorinated before being discharged into Narragansett Bay. The detritors and final settling tanks, all built of concrete, are now under construction, and it is expected that they will be completed about Oct. 1 of this year. Of the twenty chemical precipitation tanks Nos. 1 and 2 are to be remodeled for use as presettling tanks, and the remaining eighteen will be converted into aeration tanks.

The Providence chemical precipitation plant was the largest of its type ever built in this country and for some years past has been the only chemical precipitation plant in the United States, barring some possible small overlooked exceptions. It was completed in 1901, about eleven years after the Worcester precipitation plant, next largest in size of any of its kind built in the United States, and some twelve years after the plant at East Orange, N. J., which was the first chemical precipitation plant built by a city in the United States. During the years 1911, 1912, 1919 and 1920 the Providence plant was operated without the use of chemicals; that is, plain sedimentation was employed. Lime bleach has been used for disinfection since 1911.

The original sewage-works at Providence was designed by the late J. Herbert Shedd and Otis F. Clapp, successively city engineers. The change from chemical precipitation to the activated-sludge process is being made under the direction of S. Frank Nolan, city engineer. Operation of the Providence sewage-treatment works has been in charge of Julius W. Bugbee since the plant was put into use.

Stormwater Pumping Station at Detroit

Circular building houses four (ultimately eight) 84-in. vertical-shaft motor-driven screw pumps of 500 sec.-ft. capacity—No trash racks at intake—Pump tests

By MILTON F. WAGNITZ
Engineer of Public Structures, City Engineer's Office, Detroit, Mich.

THE Connors Creek stormwater pumping station at Detroit, Mich., which was placed in operation in the summer of 1930, is the final link in the stormwater relief program for the East Jefferson Ave. district. A view and drawing of the station are shown in Figs. 1 and 2. The district which this station primarily serves is a low flat area of about 2,733 acres extending from Mack Ave. to the Detroit River and from Bewick Ave. to Alter Road, a considerable part of this area being below the level of high water in the Detroit River, as described in *Engineering News-Record*, May 23, 1929, p. 832; also May 29, 1930, p. 884. In addition to this main area, the low flows from the Fox Creek district, comprising an ultimate area of 14,733 acres, are carried to this station through the 14-ft. relief sewer in Jefferson Ave. The several areas tributary to the pumping station are shown in Fig. 3.

Pumping Station—The pumping station is circular in shape, having an external diameter of 112 ft., with the floor of the suction well about 50 ft. below grade, while the roof rises 66 ft. above grade. An underdrainage system is provided, as in the case of the intake well, described in the other article mentioned. Stormwater enters the station through two 14-ft. sewers capable of carrying the ultimate design flow of 4,000 sec.-ft. without causing flooding in the district. Access to the suction chamber is provided by a stairway from the outside of the structure. An electric elevator is installed which can be used for removing timbers and large debris from the suction well. In the event of failure of power during a heavy storm, considerable surge will take place. A weir has been provided between the surge chamber and the outfall sewer with such capacity that the entire surge flow of the sewer may bypass the pumps.

Pumping Equipment—In the complete plant eight pumps will be included. The initial installation consists of four 84-in. vertical-shaft, single-suction screw pumps, driven by electric motors of 2,300 hp., using 4,600-volt, three-phase, 60-cycle current and running at 200 r.p.m. These pumps, one of which is shown in Fig. 4, have a capacity of 500 sec.-ft. each, at 27-ft. head. As they are designed to pass a sphere 16 in. in diameter, it was considered unnecessary to provide racks or screens of any type. Two sump pumps are installed to remove any accumulation of water in the suction well, as this might become stagnant during the dry season.

The pumps operate under a suction lift of 10 to 19 ft. and therefore require priming, which is accomplished without the use of any valves, as indicated in Fig. 5. The discharge line includes a siphon, in the downstream leg of which the river stands at levels varying from El. 90 as a minimum to El. 98 as a maximum. The suction bell extends to within 4 ft. of the suction well floor, which is 5 ft. below the invert of the two sewers connected to the station. Priming is effected by means of four motor-driven vacuum pumps which are cross-connected to each of the four pumps. As the air is exhausted from the siphon the water in the downstream leg rises and spills over onto the pump impeller, which has previously been started and is running at full speed. Through an airpipe connection to the bottom of the impeller the air in the suction well is exhausted and the water in the well rises to the impeller, thus accomplishing the priming. Each vacuum pump is capable of priming a pump in six minutes. The vacuum is broken by an automatic breaker which functions when the power is shut off.

Pump Tests—The contract for the pumping equipment provided that one of the units should be tested in the field. This was accomplished by returning water from the Connors Creek sewer and storing it in the tunnels. A weir was placed in the discharge channel at sufficient distance to assure streamline flow, and the elevation of the water surface in the suction well was determined by float gages on each side of the well. The elevation of the water surface in the discharge channel was measured by float gages in gage wells in each side of the discharge channel near the pump discharge. The head on the weir was read with a hook gage and point rod just above the weir, the hook gage being in a stilling chamber and the point rod in the channel opposite the stilling well. Electrical measurements were taken with calibrated instruments. The discharge over the weir was computed as an average of the results obtained from the formulas of Bazin, Rehbock and Fteley-Stearns.

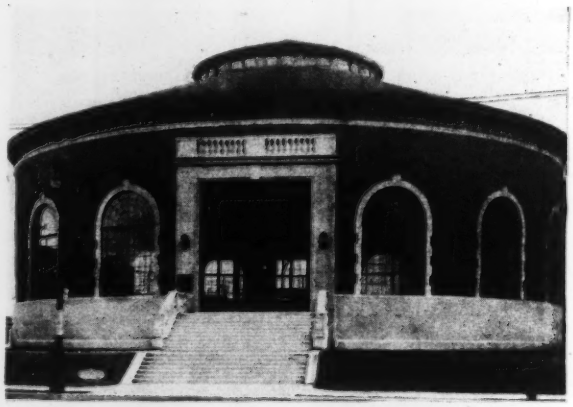


Fig. 1—Connors Creek stormwater pumping station

These tests showed that the contract guarantees were met in every respect. The guarantees included capacities of 537, 500 and 441 sec.-ft. with heads of 20, 27 and 35 ft., respectively, at an average over-all efficiency of 69.271 per cent from 20- to 30-ft. head.

Superstructure—The building, which has an internal diameter of 106 ft., consists of a steel framework with columns carrying the domed roof, which is provided with

heavy compression and tension rings. The circular runway for the 20-ton revolving crane of 103-ft. span is carried on the steel columns. Fig. 1 shows the Jefferson Ave. elevation. The exterior of the building is finished with red brick and limestone trim, while the interior is of light-colored salt-glaze brick. Floors are finished in red quarry tile and the roof with red Spanish shale tile. The pump room and boiler room are finished in white enameled brick.

The station is heated by means of direct and indirect radiation, connected as a two-pipe vapor system. Steam is furnished by an oil-burning low-pressure boiler with 7,500 sq.ft. of heating surface. Fresh air for ventilation is supplied by means of a fan in the indirect heating system. The primary switch house, which is a separate building, is heated by direct radiation. Electrical service consists of two 24,000-volt, three-phase, 60-cycle feeders from two separate substations and connected to two transformers delivering 4,600-volt current by underground cables into the primary switch house, from which it is distributed to the oil circuit breakers and thence by underground cables to the pump motors. Red and green lamps on the control switches indicate when the breaker is open or closed.

Each motor is started through a pushbutton on the main switchboard in the pumping station, which closes the circuit breaker and puts full voltage on the motor for starting. When the motor has nearly reached synchronous speed, a relay causes the field contactor to close, which excites the motor field and causes the motor to pull into step. Three 35-kw. motor-generator sets with pushbutton control and field rheostats furnish direct current for the fields of the motors, each set providing sufficient field current for two motors. A 60-cell storage battery to operate the solenoids on the oil circuit-breakers can be used for emergency lighting if a failure occurs in the power source. Provision has been made to install

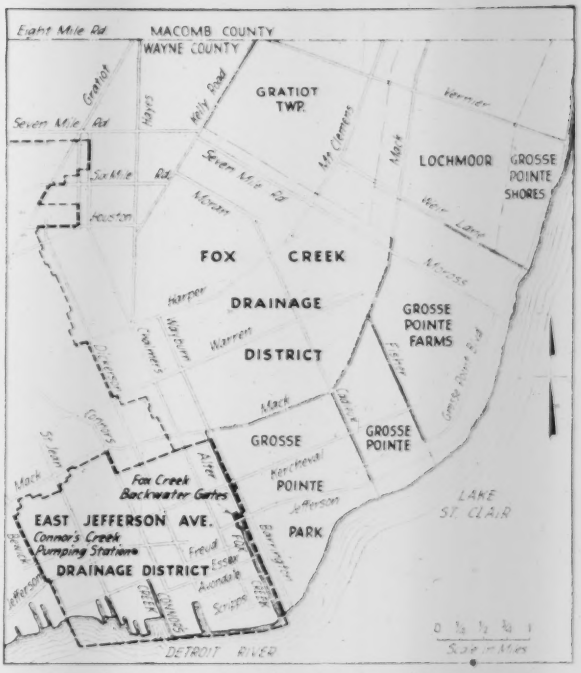
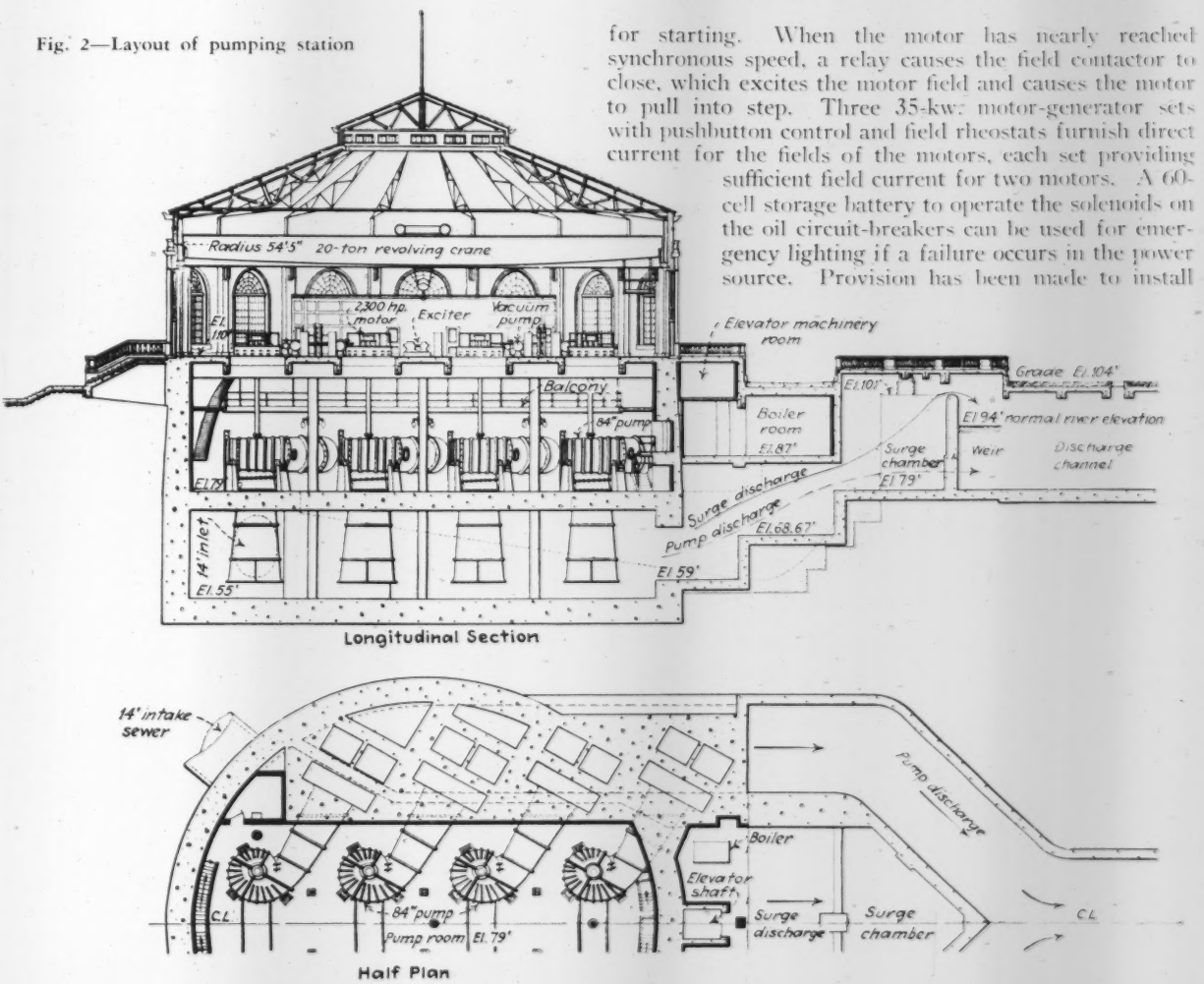


Fig. 3—District served by Connors Creek pumps

Fig. 2—Layout of pumping station



the electrical equipment for four additional pump motors of the same size.

Construction Work

The construction method used at the plant was dictated by the experience obtained with the intake well at the same location (see *ENR*, May 23, 1929, p. 832.) In order to prevent uplift in the bottom the earth in the central portion was left intact while the circular wall was placed.

Operation was started with a 2½-yd. dragline machine which excavated the ring in the soft blue clay down to El. 77. While this was in progress open caissons of steel sheetpiling for the wall segments were carried down to El. 49, which was the bottom of the suction chamber floor. These segments, which were built alternately to reduce ground disturbance, were about 15 ft. long and were braced as the hand excavation was carried down. Each wall segment was poured in forms inside of the caisson. Upon completion of the wall, except for the south 90 ft. and up to El. 75, the entire center was excavated with the dragline, the 6-ft. concrete slab floor being placed as the excavation progressed. The remainder of the walls and floors were poured in stages as rapidly as the mixing plant capacity permitted. Fig. 6 shows the work during construction.

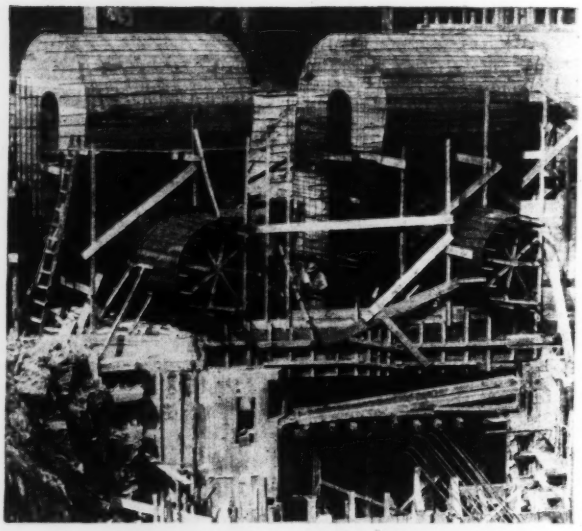


Fig. 6—Forms for siphons and discharge channels

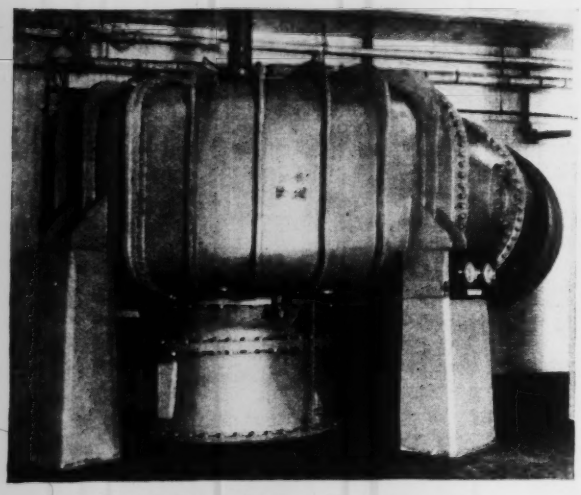


Fig. 4—Motor-driven 84-in. screw pump

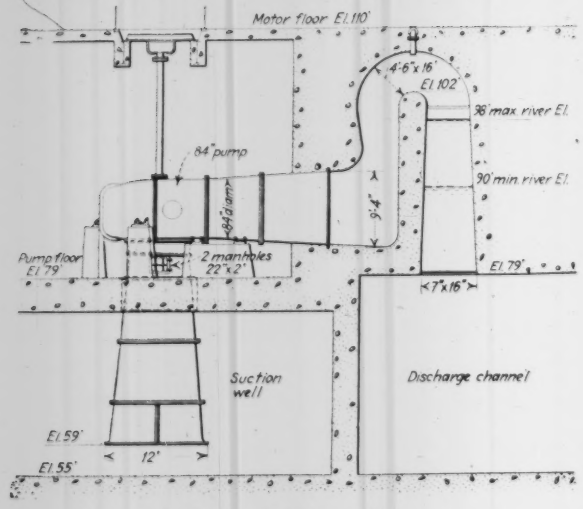


Fig. 5—Priming siphon

Engineers and Builders

The contract for the buildings and foundations of the plant was let to Lennane & McIlvenna, Detroit, Mich., for $956,548. The Worthington Pump & Machinery Corp., Harrison, N. J., furnished the pumps, motors, piping and vacuum pumps at $153,734. Electrical equipment was furnished by Miller-York, Inc., Detroit, at $79,500, and the transformers by the American Brown-Boveri Co., Camden, N. J., at $24,450. The engineering work was done jointly by the bureau of public structures, of which the writer has charge, and by Ayres, Lewis, Norris & May, consulting engineers, Ann Arbor, Mich. The design was made under the direction of Perry A. Fellows, then city engineer, and John W. Reid, then commissioner of public works. Harrison P. Eddy, Gardner S. Williams and Louis E. Ayres acted as consulting engineers.

Concrete Monoliths for Italian Docks

Concrete blocks of 400 tons weight are being used for the extension of the breakwater at Genoa, Italy, to protect a series of five new piers extending into the Mussolini basin. These piers, each with two rows of cargo sheds with railway tracks between, have their side walls of similar blocks. The blocks are made on a waterfront platform, the concrete being delivered to the forms by conveyors and left for some weeks to set and harden. In placing a block it is picked up first by a traveling gantry crane that spans the platform and carries hydraulically operated grips, these grips engaging pockets formed in the concrete. The crane sets the block at the end of the platform, where it is picked up by a similar gantry on a float or pontoon large enough to carry several blocks. This pontoon is then towed out to the end of the completed work, and its gantry crane sets the blocks in place. A new port railway station, completed recently as part of the improvements, provides extensive facilities for passengers arriving and leaving by steamers.

I-Beams Support Form System for Concrete Deck-Girder Spans

By EUGENE B. STOKES
Ira C. Hedrick, Inc., Consulting Engineers, Hot Springs, Ark

A FORM SYSTEM carried by I-beams resting on column brackets was used for the construction of 57 concrete deck-girder approach spans on the recently completed state-owned toll bridge across White River, between Augusta and Bald Knob, Ark. Conventional falsework for supporting the forms was considered hazardous and questionable because of the great height of the approach structure above ground level, a maximum of 65 ft., and the frequency of high water flooding the ground area. The main bridge consists of a 640-ft. cantilever steel structure with a clear span of 400 ft. between main piers, providing a vertical clearance of 47.2 ft. above 1927 high water for a horizontal chord of 125 ft. The steel was cantilevered out from the main piers, and closure was made at the mid-panel of a 160-ft. suspended span.

The approaches consist of fifty-one 40-ft. and four 80-ft. concrete deck-girder spans and two 30-ft. cantilever retaining walls. The over-all length of the bridge is 3,064 ft. Each approach is built on a 4 per cent grade, and the maximum height of the approach, from crown of roadway to ground surface, is 65 ft. The approach spans are of the two-girder type with the girders resting on columns at a construction joint about 3 ft. below the girder bottom. The approach slab is of the two-way reinforced type, 9½ in. thick, with a clear roadway of 24 ft.

Form System—Two 24-in., 79.9-lb. I-beams, 30 ft. 9 in. long, were used to support the soffit plates of each girder of the 40-ft. spans. The ends of the beams rested on cast-iron brackets attached to the sides of the columns by 2-in. bolts running through the columns at a point 3 ft. 6 in. below the girder bottom. Hardwood wedges long enough to rest on the top flanges of both beams were used to adjust the soffit plates to exact grade and to provide for camber.

The girder side forms rested indirectly on the wedges. The deck forms were supported by 2x10-in. joists with ends resting on the tops of the girder inside forms and supported at the third points by longitudinal 2x6-in. timber trusses, which were in turn supported by transverse 6x8 hog trusses with ends resting on the flanges of the I-beams. Sectional forms were used throughout. Fig. 1 shows details of the form system.

The same I-beams were used for the 80-ft. spans, one end resting on brackets on the columns and the other end supported by a bent of timber falsework resting on timber piling. Two bents of falsework for each 80-ft. span were all that were required for the whole job.

Fig. 2—East approach White River toll bridge, showing method of supporting 80-ft. concrete deck-girder span

This system of supporting the forms proved very successful and more economical than the usual falsework. Once the I-beams were in place the ground conditions in no way interferred with the building of forms. The entire approach was built with only six spans of complete forms. The 40-ft. spans were poured continuous for three spans, and the 80-ft. spans for two spans.

The steel span was erected by the Missouri Valley Bridge & Iron Co., Leavenworth, Kansas; P. K. Bunn, superintendent. The approaches were built by Parham Construction Co., East St. Louis, Ill., E. O. Alexander, superintendent. Ira G. Hedrick, Inc., was designer and supervisor of construction, with the writer as resident engineer.

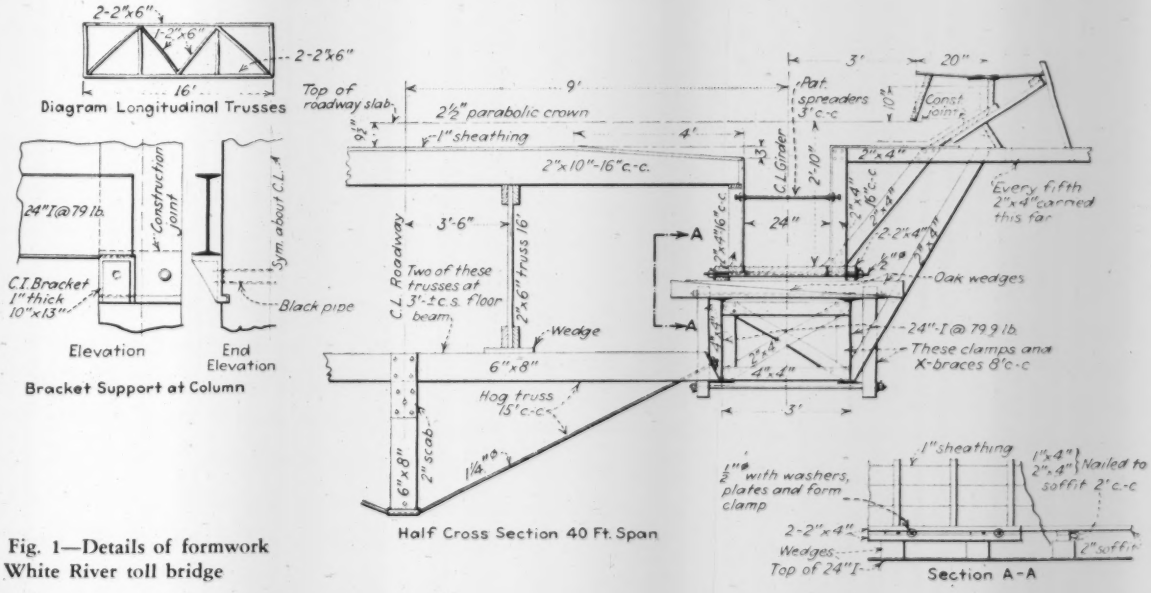


Fig. 1—Details of formwork White River toll bridge

Building the Pacific Northwest

Ralph Budd in address to civil engineers reviews the work of railways and engineers in opening the Puget Sound region

ADDRESSING the American Society of Civil Engineers at its Tacoma meeting recently, Ralph Budd, president of the Great Northern Railway, presented an illuminating review of the part played by railway development and other engineering construction in the growth of the Pacific Northwest. Referring first to the surveys of Vancouver in Puget Sound and Captain Robert Gray's discovery of the Columbia in 1792, he came to the Lewis and Clark expedition in 1805 and John Jacob Astor's establishment of a trading post at Astoria in 1811. Thirty-five years after Astoria was established the Canadian boundary was fixed, and this event was soon followed by the Pacific Railway Surveys, made at the direction of Congress in 1853 and 1854, with I. I. Stevens in charge of the Northwest country. A brief extract from Mr. Budd's address follows. —EDITOR.

THE rugged topographical features of the Pacific Northwest presented at once unprecedented obstacles and unequaled opportunities for the engineer. The Rocky and Cascade mountain barriers in earlier times would have been considered natural national frontiers. Indeed they were so considered by many during the years preceding 1846 when there was grave question of the practicability of successfully maintaining, as a part of the United States, so remote and inaccessible a region. The success of the railway as a transportation agency and the feasibility of operating railways on fairly steep grades through mountainous country were really the determining factors in making the Pacific Northwest an integral and homogeneous part of the Union, and also made possible its phenomenal growth in population, in wealth and in industry.

Railway Projects

The most important early engineering undertaking after Lewis and Clark's expedition was the exploration known as the Pacific Railway Surveys, carried out by order of Congress in 1853 and 1854. Isaac I. Stevens, later the governor of Washington Territory, had charge of those surveys in the Pacific Northwest. Simultaneously with his activities in the north, three other routes were surveyed farther south. The result of these surveys, published in 1855 as senate and house documents, gave to the public for the first time accurate and, for the most part, complete data as to the feasibility of building railways across the Western mountains, information as to where such crossing could best be made, the approximate cost of construction, the length of the lines, character and resources of the country traversed and other pertinent facts. This set of thirteen books contains, in my opinion, more important source material about the West than is found in any other public or private report.

After these surveys had been made and the reports published, transcontinental railway projects were pressed more persistently upon the public and the westward expansion following the war carried with it the Union Pacific, Central Pacific and Northern Pacific railway construction, which, in turn, opened up the adjacent country for quick settlement. The Northern Pacific reached Portland and Tacoma in 1883; and in 1884 the Oregon Short Line was connected up. In 1887 the Northern Pacific crossed the Cascades with its line from the confluence of the Columbia and Snake rivers at Pasco. In January, 1893, the Great Northern reached Puget Sound, and in 1909 the Milwaukee road completed its line from the Missouri River at Mobridge to the Pacific.

Following the general routes indicated by Isaac I. Stevens in the north and the Oregon Trail in the central zone, the locating engineers were able to overcome the mountain barriers usually with maximum gradients of 100 ft. per mile and curves that generally have radii longer than 600 ft. A few names stand out, particularly among the men who had a creditable part in building the early railways into the Pacific Northwest: Grenville M. Dodge, W. Milnor Roberts, Virgil G. Bogue and John F. Stevens are four of them. All had to do with planning and constructing the rail and water terminals at Tacoma and Seattle. All of them achieved greatness beyond the limits of the Pacific Northwest, but here they were active in their prime, the first in building the Union Pacific and the next two in building the Northern Pacific; while Mr. Stevens, a little later, located and had an important part in extending the Great Northern to the Coast for James J. Hill through an unoccupied territory 100 miles or more to the north of the Northern Pacific. Railway construction and improvement have constituted an important part of the activities of the civil engineer in the Pacific Northwest, but in the later years the work had been handled through large organizations and the accomplishments of individuals have been less conspicuous for that reason.

Building Cities

The rapid influx of population following railway construction called for the creation of all the municipal improvements that are identified with the modern city; and in the case of the seaports the problem of harbor facilities also was present. Promotional plans were put forward and some visionary projects were advocated, but in the main it is noteworthy that the future growth was appraised quite accurately by the early planners. There was much discussion as to where the ultimate Puget Sound metropolis would be located and perhaps not enough realization of the fact that the east shore of Puget Sound all the way from Olympia to Bellingham would become a series of splendid ports.

Virgil Bogue believed the terminals would be extensive, and after years of close contact with the question he established what he called a "common point" and set a large post, so marked, at a place not far from the center of the present Auburn railway yard. He considered that point to be about where traffic would concentrate from along the coast for transportation eastward or for distribution westbound. All the pioneer engineers seem to have believed that there would be a large city at Tacoma and another at Seattle, and they set about providing for these eventualities. It is a remarkable thing that one of those persons, who as a cub engineer sitting around the campfire with Virgil Bogue and T. B. Morris heard them discuss the question of where the future municipal developments would be, should afterward take a leading part in those developments and should now again be the city engineer of Seattle. I refer to R. H. Thomson, who from 1884 to 1886 was city surveyor and from 1892 for twenty years was city engineer, during the time when he planned and carried out

the great regrade and harbor improvements that involved the moving of 52,000,000 cu.yd. of material and the reclaiming of 1,600 acres of tide-flats upon which the great railway yards and some of the most important business houses are now located.

It is pleasant to know that Mr. Thomson, still a young man mentally and a most delightful raconteur, is attending as many of the sessions of this convention as his very active duties will permit. It is worthy of note also that the harbor developments at the south end of the city of Seattle were carried out according to Virgil Bogue's original conception for improving the mouth of the Duwanish River, and that Hiram M. Chittenden planned the Lake Union locks as well as the port improvements in the northerly part of Seattle.

LETTERS TO THE EDITOR

Floodflows Over Embankments

Sir—In your issue of April 2, 1931, there appeared an article by A. S. Fry and G. H. Hickox on calculation of floodflows over embankments. The tests run at the University of Iowa hydraulic laboratory are shown to be very useful in making estimates of valley discharge where overflows of embankments occur. This is no doubt true in many instances, but under conditions obtaining during the 1927 overflow of Missouri Pacific track in White River valley south of Newport, Ark., and similar cases, the writer is of the opinion that the results obtained will not be a correct measure of the valley overflow and that waterways based upon such estimates will be excessive.

The hydrograph of the U. S. Weather Bureau gage readings at Newport, located above the railroad embankment, shows a fairly regular rise from April 10 to 14 up to a stage of 30.2, about where the valley flow reached the bottom of the bridge stringers 2.5 ft. below the top of rail. A sharp increase in the rate of rise took place from then to the morning of the 16th, when crest was reached at a stage of 35.6 and remained there to the morning of the 17th. It seems that during the 14th and 15th considerable storage accumulated above the track because the increasing valley flow did not find compensatory increased waterway on account of the obstruction of bridge decks. This storage increased until sufficient overtrack flow area was reached to give total discharge equal to the normal valley discharge. During this time the overtrack area of flow increased rapidly due to track and ballast washing off the embankment. As the crest was reached the maximum discharge over and under the track from storage was considerable. So I find the 552,000 sec.-ft. discharge for the 1927 flood at a stage of 35.6, as estimated by the Morgan Engineering Co., does not appear reasonable when compared with an estimate of 310,000 sec.-ft. in 1916 at stage of 34.3 made by C. E. Ramser, senior drainage engineer, U. S. department of agriculture.

A study of several high-water profiles along embankments across wide river valleys has led the writer to the conclusion that there is a relation (*a*) between flood slope, total valley width and total length of openings required to pass major floods with given permissible "head" or drop in water surface across the track; (*b*) between the flood slope and length of continuous permissible embankment, which, when known, will give proper spacing of waterways.

A simple rule based on these relations can be worked out that will give closer approximations than any formulas using estimated discharge quantities. The necessary data could be easily obtained, and it is hoped and expected that such a rule, based upon actual measurements of existing conditions, will sometime be worked out. In fact, we now largely use a rule, but the information from which it was made up is not complete; therefore we would hesitate to publish it in its present form. We have more confidence in it, however, than in any other method known to us for estimating waterways for major streams with wide overflow valleys.

G. W. Payne,
Assistant Engineer,
Missouri Pacific R.R. Co.

St. Louis, Mo.,
June 28, 1931.

An Old Book of Prices

Sir—I believe I have found something that may be of interest to builders, a book entitled "The Book of Prices," adopted by the House Carpenters of the Borough of Pittsburgh, Feb. 15, 1813. It was printed in Pittsburgh by S. Engles & Co., Wood St., in 1813. The entire book was compiled by a committee of seven and was certified by one D. Caldwell, clerk of the district court of Pennsylvania. On the second page headed "Advertisement" is the following:

> The House Carpenters of the Borough of Pittsburgh, having seen with regret the numerous difficulties arising from the want of an established book of prices and a regular mode of measuring work, did, at a general meeting, composed of those persons whose names are annexed to this book, appoint the subscribers as a committee for the purpose of forming such a standard as would obviate those difficulties. In compliance with this appointment and after having given the subject the most deliberate investigation, we do certify that the following prices are just and equitable, and as such to be considered the only standard for the measurement of carpenters' work in the borough of Pittsburgh. James Cooper, Richard Robinson, John Roseburgh, John W. Johnson, John Carson, Richard Geary, Matthias Evans.

The book gives the prices to charge on carpenter work under the following headings: framing, shingling, cutters, dormer windows, reveal boards, trapdoors, doorframes, windowframes, jamb casings, weather boarding, canting and corner strips, barge boards, floors, plank floors, ashlins, doors, pannel doors, shutters, pannel shutters, Venetian shutters, inside shutters, ovolo sashes, show windows, cornice, wainscot, ladders, stairs, geometrical stairs, ceiling, shelves, skirting, surbase, architraves, cellar doors, centers, mantels, Gothick reeded pilasters, tabernacle frames, balconies and porches, lattice work, capping walls, fences, gates, palisade fence, pediments, columns, racks and mangers, cupolas, and cisterns for breweries.

Under each one of these headings are the charges for the various forms of work. However, this is not the most interesting part of the book. I am copying in this letter two paragraphs:

> **Rules and Regulations for Measuring Carpenter Work**
>
> Each carpenter to measure his own work. If he is not competent to the task, he may call in a measurer at his own expense If the carpenter's bill should be disputed, and one or two measurers are called, and his bill, upon examination, is approved of, the proprietor of the building shall pay the whole measuring charge; if otherwise, each to pay an equal proportion.
>
> **Charge for Measuring**
>
> All bills not exceeding $100, 3 per cent.
> Ditto above that, and under $500, 2 per cent.
> Ditto above that and under $1,000, 1½ per cent.
> Ditto all above that sum, 1 per cent.
> If two measurers are called, add one-fourth to above.

I have another book, a "Bill of Prices" adopted by the Mount Pleasant Association of Joiners and Carpenters, dated March 4, 1856, published by McFarland & Tanton, Mount Pleasant, Iowa, giving regulations for measuring work and charges for measuring, a copy of which follows:

> Bills of $100 and under, 2 per cent; $500 and over, 1½ per cent; from $500 to $1,000, 1 per cent; all sums over $1,000, ¾ per cent; if two measurers, add ¼ to this per cent.
>
> For making out a bill for building, charge one-half the per cent as for measuring work and making out a bill on same.

Some of the subjects of the chapters in this book I believe will require the present-day contractor to go to the dictionary While I am familiar with them, there are some that are seldom used now.

H. O. McMillan,
President M & M Wire Clamp Co.

Minneapolis, Minn.
July 15, 1931.

NEWS OF THE WEEK

Illinois Wage-Rate Law Cancels Contracts

All bids for public works which were received before July 1 and on which no awards had been made by that date are illegal and invalid under the new wage-rate law of Illinois, according to an opinion given by the attorney general, O. E. Carlstrom. In cases where the award was made and the successful bidder was so notified in writing before July 1, the contract is valid, as the actual signing of the contract after that date is merely formal evidence of an award made previously. This law is held to apply to all work under public bodies, including commissions and school districts.

Nicaragua Canal Feasible, Col. Sultan Reports

In the opinion of Col. Dan I. Sultan, the engineer officer in charge of the resurvey of the Nicaragua Canal route, a canal across Nicaragua is feasible from an engineering standpoint and can be constructed for $750,000,000. Col. Sultan, who has just returned from Central America, believes that two lock canals, one at Panama and one at Nicaragua, would provide a greater factor of security in time of war.

While admitting that there is little present need for the Nicaragua Canal as far as commerce is concerned, Col. Sultan believes that the time will come when the Panama Canal will be used to capacity. As to when this time will be, he refuses to prophesy. He thinks that it is significant, however, that the traffic experts invariably have fallen short of the mark in estimating the expansion of the Panama Canal.

As to the time that it will require to build a canal across Nicaragua, Col. Sultan estimates that it would be nearly fifteen years—ten years for the construction work and five years for the necessary legislation and treaties. While the Nicaragua Canal would be 173 miles long as compared with 50 miles for the Panama Canal, it is not expected that the engineering problems would be any more difficult. No location on the Nicaraguan route would cause the trouble with slides that was experienced in the Culebra Cut, Col. Sultan states. He feels, however, that the best point in favor of the Nicaraguan project is the unlimited supply of water. The canal would be supplied by Lake Nicaragua, which is one-third the size of Lake Erie. Col. Sultan does not believe that the earthquake menace would be a serious detriment to the canal.

New Appointments to Seattle's City Offices

J. D. Ross, dismissed as superintendent of Seattle's municipal lighting department on March 9 by Mayor Frank Edwards and returned to that position on July 14, following the recall of Edwards, has been named chairman of the board of public works by Robert H. Harlin, former councilman, named mayor by the city council.

Other members of the board named by Mayor Harlin are: E. W. McMorris, city engineer, succeeding R. H. Thomson; A. F. Marion, superintendent of water, succeeding William Severyns; W. T. Bickford, superintendent of building, succeeding J. L. Hardy; and H. W. Dail, superintendent of streets and sewers, succeeding Dan Boyle.

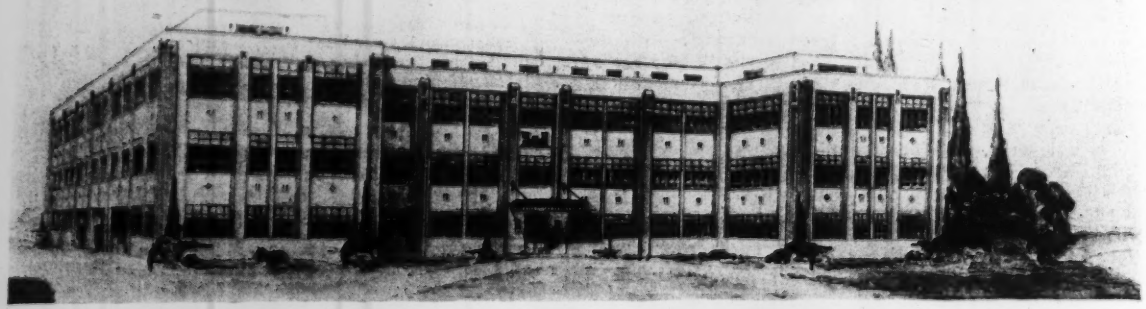
No Cut in Public Works Program, Secretary Hurley Announces

While drastic reductions will be made in the federal budget to be presented to Congress Dec. 7, the cuts will not apply to public works. A formal statement to that effect has been made by Secretary of War Hurley in which he pointed out that the administration is pledged to provide water transportation for farmers at the earliest possible time. It is also pledged to provide maximum safety against overflow to the lower Mississippi Valley. For those reasons, as well as for the reason of providing employment, Secretary Hurley expects that there may even be an increase during the next fiscal year of the amounts made available for river and harbor work.

New Location for Dam Asked on Grand River, Oklahoma

The Grand Hydro Electric Co., Tulsa, Okla., has made application to the Oklahoma Conservation Commission for permission to construct the first units of its hydro-electric project on Grand River in northeastern Oklahoma. Hearing on the application has been set for Aug. 17. Permission is asked to construct a concrete storage and power dam, a power house, a streamflow equalizing and power dam and to install initial generating units of 25,000-kva. capacity. The company holds permits to construct four dams along the Grand River in Wagoner, Cherokee and Mayes counties. The new location asked is in the north end of Delaware Country.

Under original plans the Grande Hydro development was to develop more than 400,000 hp.



NEW BUILDING TO HOUSE MEMPHIS ENGINEER DISTRICT OFFICES

Architect's drawing of the new building to be constructed for the Memphis Engineer District, a recent consolidation of the First and Second Mississippi River Commission districts, the Memphis River and Harbor District and the Mississippi River Dredging District. The building will be located at the supply and repair depot on the west bank of the river about 1½ miles below Memphis. It will be a three-story monolithic concrete structure supported on wood and concrete piling. The ground floor will be used as a garage.

Emergency Hetch Hetchy Pipe Line Planned for San Francisco

The San Francisco board of supervisors has approved immediate construction of a 45-m.g.d. capacity emergency pipe line over the Coast Range to bring Hetch Hetchy water to San Francisco ahead of the completion of the Coast Range tunnels now under construction on the Hetch Hetchy line. The emergency line, 25.9 miles long, with pumping lift of 1,325 ft., will connect the west end of the San Joaquin Valley section, now under construction, with the supply system in operation across San Francisco Bay. The estimated construction cost is $1,850,000. This decision was made following recommendation made by M. M. O'Shaughnessy, city engineer, in a report requested by the board of supervisors to avert a possible water shortage in San Francisco. Completion of the emergency line and the San Joaquin line is planned for next spring.

Failure of Erection Derrick on New York Building Kills One

One steelworker was killed and nine others were injured when an erection derrick toppled off the fifth floor of an addition to the New York Telephone Co. building on July 22, adding another chapter to New York's long list of building derrick failures. The accident occurred while a load of beams was being hoisted from a truck in a driveway, off the street, and was apparently caused by failure of one or more beams supporting the derrick, although no statement has been made by the A. E. Norton Co., the steel erector, nor can anyone in the organization be reached who will discuss the matter. Mast, boom and load crashed into the driveway, tearing out several steel members from adjoining bays. Marc Eidlitz & Son are the general contractors.

Hoover Dam Notes

In connection with the railroad being constructed in the canyon at the Hoover Dam, 135,000 cu.yd. of excavation in open cuts and 8,000 cu.yd. of tunnel excavation had been done up to the close of work July 18. The railroad to the gravel pit is 13 per cent completed. Electric power is now available for shovels. An electric shovel started work at the outlet of the Arizona outer tunnel July 16. Two days later 210 ft. of work had been done on the pioneer tunnel in the Arizona inner tunnel. In the Nevada inner tunnel 123 ft. of pioneer tunnel has been completed in a downstream direction and 117 ft. in an upstream direction. Mucking machines now are being used in the Arizona adit and in the Nevada inner tunnel.

Dismantling of the diamond drill camp was completed July 14. Work of preparing some 70 batches of concrete for testing purposes has been completed. All of the 8x16-in. concrete cylinders with a water ratio of less than 0.7 have been shipped to Denver. They are coated with an asphalt emulsion to check evaporation and will be tested in the large machine available at Denver. The laboratory at Denver is now complete. The organization consists of two associate engineers, one assistant engineer, ten junior engineers, one junior chemist, one sub-foreman, one machinist, one carpenter and two laborers. Several preliminary tests for specific heat have been made. Other tests for conductivity are in progress.

Advertisements have been issued for building materials for the administration, dormitory and municipal buildings at Boulder City.

Bids for $19,000,000 New Orleans Bridge Due Sept. 15

Bids for the construction of the $19,000,000 Public Belt railroad and highway bridge over the Mississippi River just above the New Orleans city limits will be opened in New Orleans Sept. 15. It is expected that the bridge will be used by the Southern Pacific Lines and possibly the Texas & Pacific Railroad. The State of Louisiana has applied $7,000,000 of its road bond issue to the bridge to take care of the highway portion of the structure, thereby making New Orleans easily accessible to farmers and others on the west bank of the river.

Bids call for four proposals—for the substructure of the bridge, for the bridge superstructure, for the substructure of approaches and for the superstructure of approaches.

A board of engineers is to be appointed to make a study and survey of local freight terminals, based on the findings of the commercial affairs committee, with unification as the ultimate purpose. When this board has completed its work its report will be submitted to the various railroads entering New Orleans for their consideration.

Indictments in Baltimore for Wage-Law Violation

Two contracting firms and three individuals have been indicted by the grand jury at Baltimore charged with violating the city charter provision which requires the payment of no less than the current minimum rate of wages to employees engaged on municipal work. These indicted are the Whiting-Turner Construction Co., which is building a large conduit to carry water between Druid Lake and Montebello Lake; the Mullan Contracting Co., which is doing some public school work; Eric and Anthony Lassotovitch, doing some concrete work in connection with one of the schools, and Basil B. Wells, who has contracted to paint several schools and fire engine houses.

Members of California District Securities Commission Named

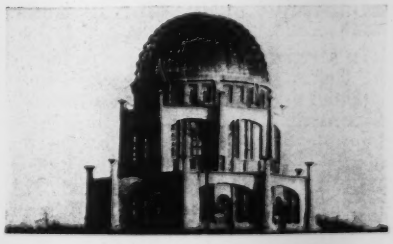
Members of the newly created California District Securities Commission, approved at the last legislature to aid in stabilizing bonds of irrigation and reclamation districts, have been appointed by the governor. H. E. Vogel, director of Fresno Irrigation District, and M. J. Dowd, chief engineer of the Imperial Valley Irrigation District, are two of the members of the commission.

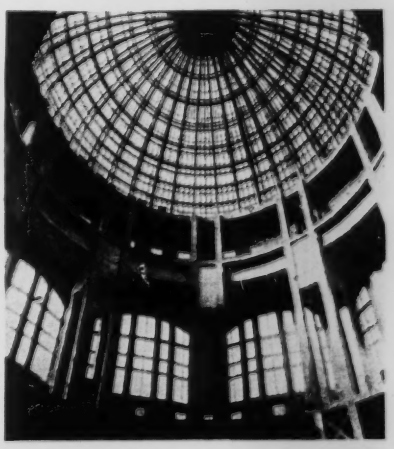
Two States Pass Laws in Aid of Erosion Control

To save farm land from erosion the legislatures of Texas and Oklahoma have passed laws authorizing county officials to permit land owners to use county road machinery such as tractors and graders to construct terraces on their properties when the machines are not in use on road work. In Texas the farmer will pay a reasonable rental for the machinery; in Oklahoma he will pay only for its operating cost.

UNIQUE RELIGIOUS STRUCTURE IN CHICAGO SUBURB

The Baha'i Temple in Wilmette, Ill. (*ENR*, Jan. 8, 1931, p. 75), is a nine-sided structure of steel and concrete framing with walls and roof of glass set in concrete tracery. Inner and outer dome framework are carried on separate column systems. The central hall is 72 ft. in diameter and 103 ft. high.





Water Bond Issue Proposed for Southern California

The board of directors of the Metropolitan Water District of Southern California has decided upon submission of a bond issue of $220,000,000 to the voters on Sept. 29 to finance the immediate construction of an aqueduct and auxiliary features along the Parker route from the Colorado River. The board's action was taken on the recommendation of F. E. Weymouth, chief engineer of the district. In approving Mr. Weymouth's recommendations, the board decided upon an aqueduct with an ultimate average capacity of 1,500 sec.-ft. and reiterated previous selection of the Parker route. The proposed $220,000,000 bond issue, according to Mr. Weymouth, is the amount necessary to put the project in operation and deliver water to each of the district's member cities.

The amount of the proposed issue, however, is not the total final cost of the aqueduct and appurtenances. This, according to Mr. Weymouth's report to the board, is placed at $283,536,000. The bond issue recommended by Mr. Weymouth and approved by the board would cover the initial cost of construction of the diversion dam, main aqueduct, terminal storage and some delivery lines. The cost of these items is estimated at $218,844,000. Whether the deferred construction work should be financed by a future bond issue or from revenue should be left for future determination, Mr. Weymouth advised in his report.

Prizes Offered for Operating Betterment

During 1931 the Chain Belt Co., Milwaukee, Wis., found that through the application of modern machinery its costs could be reduced by more than the reduction in cost of the material. Believing that in every plant, no matter how well mechanized, there are points where material piles up, unnecessary labor is used, machine operations are interrupted, or better transportation is needed, the company is offering $500 in prizes.

For the best descriptive articles and rough sketches showing how chain and belt conveying or other Chain Belt Co. products, including construction machinery, can be applied to lower costs, the company offers a first prize of $200, a second prize of $100, a third prize of $50 and fifteen prizes of $10 each.

Articles must be on possible new installations or replacements of existing installations and must contain definite data on possible cost reductions and be accompanied by a rough sketch. All entries must be received at the offices of the company before 5 p.m. on Sept. 21. Contestants may submit as many sets of articles and sketches as they wish, provided they cover different proposed installations. Other details may be obtained on application to the company.

Hydraulic Engineer Honored

A bronze plaque in memory of Prof. Hans Detlef Krey, the gift of American engineers, was unveiled on July 13 at the government hydraulic laboratory at Berlin.

Dr. Krey, at the time of his death in July, 1928, was one of the leaders of all Europe in the application of hydraulic theory and experimentation to practical problems. Born at St. Margarthen, on the lower Elbe River, Dr. Krey obtained

his technical training at the Technical University at Munich and at Berlin, where he specialized in hydraulics and bridge construction. After graduation in 1899 he went into government engineering work, chiefly in water supply, canal construction and coast protection. In 1910 he became director of the Government Experimental Laboratory for Hydraulic Construction and Shipbuilding. It was in this work that his peculiar qualifications for the solution of hydraulic problems through the application of the results of research were developed.

Dr. Krey was a prolific writer. In addition to many papers on hydraulics and its application, both published and unpublished, he brought out, after exhaustive research, a book on earth pressure and earth resistance, now in its third revision.

In 1927 Dr. Krey became lecturer on hydraulics and practical hydro-mechanics at the Technical University in Berlin.

Highway Construction in Texas

In a report by the chief accountant of the Texas state highway commission it is stated that on July 1 there were under construction highways and bridges in the state to cost $25,405,886. On that part of these projects already completed $11,470,221 has been paid and $14,416,851 will become due at different times during the remainder of this year.

No Patent Violation in Method of Boring Cascade Tunnel

Judge Webster, of the United States Circuit Court in Spokane, Wash., has handed down his decision in the suit brought by Arthur Crisfield Dennis and the estate of Frederick Wilson, who filed suit against the Great Northern Railway Co. and A. Guthrie & Co., contractors, alleging that the method of boring and constructing the 8-mile tunnel through the Cascade Mountains was an infringement upon Mr. Dennis' patented pioneer bore method. (*ENR*, Aug. 1, 1929, p. 190.)

The plaintiff sought an accounting of all profits made by the defendants through the use of the alleged infringement upon the patent. The defendants contended that the alleged invention of Dennis was completely anticipated by prior publications relating to the method employed in excavating the Simplon tunnel through the Alps.

"A study of the Simplon publications," observes the court, "leaves little doubt that the method covered by the Dennis patent was actually employed in excavating the great Simplon tunnel. . . . I am convinced that had the Simplon publications been drawn to the attention of the patent examiners, the Dennis application for a patent would have been denied."

Burned Docks at St. John, N. B., to Be Reconstructed

Rebuilding of the West Side properties at the port of St. John, New Brunswick, destroyed by fire on June 22, will commence immediately. A preliminary survey of the situation is now being made by Hugh Beaver, ocean terminal expert on the staff of Sir Alexander Gibb, engaged by the dominion government to report on Canada's seaports, and while final plans are dependent on the expert's recommendations, contracts are to be let at once for the clearing up of the débris at the docks and for the reconstruction of the substructure of the damaged wharves.

Universal Atlas Cement Co. Makes New Safety Record

Celebration of a new safety record was observed on July 4 by the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp. All nine of the company's plants went through the month of June without a single lost-time accident. Although in the past individual plants have gone for periods of several years without an accident, this is the first time all of the company's plants, quarries and connecting railroads have gone for one month without a lost-time accident, according to B. F. Affleck, president. Committees are appointed in each plant to inspect equipment, investigate all accidents or near accidents and make reports on causes.

Prettyboy Dam Design Modified to Meet Rock Conditions

The original design of the Prettyboy Dam, being built on the Gunpowder River by the Baltimore water department, will be modified slightly because of unexpected revelation of a large amount of poor rock at the site. The dam, designed as a full-overflow gravity-type, ogee section, concrete structure, will be changed to a restricted overflow flanked on one end by a concrete non-overflow section and a short stretch of rolled earth fill.

Although original estimates on excavation placed the amount of rock to be moved at 75,000 cu.yd., there has already been nearly 200,000 cu.yd. removed, with suitable foundations not yet in sight in some places. The rock, a mica schist, was found to be seamy and weathered to a greater depth than was revealed by diamond drill borings. Solid ledge has been exposed at the west center and east abutments of the dam, and calyx drill exploration holes reveal that the ledge is within reach all over the site. The overburden of weathered rock is proving difficult to shoot and handle.

Original plans called for a dam about 145 ft. high and 700 ft. long. Modified plans call for the overflow section to be restricted to come within the limits of two high vertical rock faces revealed in the sides of the valley, lying at right angles to the center line of dam. Because of the restricted overflow width, a concrete bridge carrying a road over the crest will be raised over the contemplated height to provide greater vertical clearance for the floodway. A wide concrete apron will be built below the ogee section. Prof. J. H. Gregory, Johns Hopkins University, is consulting engineer on the project, and B. L. Crozier, chief engineer of Baltimore, is in charge. The J. A. LaPorte Corp., Albany, N. Y., has the contract.

Minimum Speed for Dunes Highway

Indiana has placed a minimum speed limit of 40 miles per hour for traffic on the heavily traveled two-lane Dunes Highway, the main route skirting the foot of Lake Michigan from Gary to Michigan City. Slow drivers are to be shunted off the road to other routes. As motorists are prohibited from passing the car ahead, the 40-mile speed will likely be close to the maximum speed attained. Traffic officials have concluded that slow-speed vehicles are the cause of numerous accidents either directly or indirectly since impatient fast drivers overtake and attempt to pass at breakneck speeds, endangering the oncoming traffic. The 35-mile Dunes Relief Highway of four 10-ft. lanes is now under construction ¼ to 1½ miles south of the Dunes Highway. Eight miles has been built and the remainder will be completed this year.

Recent traffic surveys of the Chicago Regional Planning Association indicate a peak weekday hourly traffic of 800 vehicles just east of Gary, decreasing to 600 opposite the Dunes Park, to 500 opposite Michigan City and to 400 east of Michigan City near the Michigan line. On Sundays the peak hour runs 2½ times these figures. On the six-lane street at the Indiana-Illinois state line leading eastward the traffic reaches a maximum of 1,600 vehicles per weekday hour.

Common Brick Industry's Rules Are Revised

The common brick industry has accepted the changes in its trade practice conference rules recently suggested by the Federal Trade Commission. Ten rules relate to practices held to be violations of the law and pertain to such subjects as price discrimination; secret payment of rebates; inducing breach of contract; selling goods below cost with intent to injure a competitor; imitation of trademarks, trade names or slogans; shipping products which do not conform to samples; giving money to employees of competitors' customers; shipping goods on consignment with intent to injure a competitor; defamation of competitors; and coercing the purchase of several or a group of products.

SOCIETY CALENDAR

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Washington; annual meeting, Sept. 28-Oct. 1, Salt Lake City.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York; annual convention, Montreal, Sept. 14-17.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; fall meeting, St. Paul, Minn., Oct. 7-9.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

AMERICAN WELDING SOCIETY, New York City; fall meeting, Oct. 21-25, Boston.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Chicago; conference, Sept. 24-26, New York City.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NATIONAL SAFETY COUNCIL, New York City; twentieth annual safety congress, Chicago, Oct. 12-16.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Sept. 29-Oct. 2, Boston.

AMERICAN ENGINEERING COUNCIL administrative board will hold its next meeting in Washington, D. C., Oct. 30 and 31.

LOS ANGELES SECTION, American Society of Civil Engineers, at its monthly meeting on July 17 had as guest of honor Francis Lee Stuart, president of the national society. Sixty-five members and guests attended the meeting.

NATIONAL CONFERENCE ON CITY PLANNING, at its meeting held in Rochester June 22-24 (*ENR*, July 2, 1931, p. 31), decided to hold its next annual conference in Boston during the week of the meeting of the International Federation for Housing and Town Planning. The present officers of the conference were relected for another year.

Personal Notes

GEORGE R. WADE, city manager of Tucson, Ariz., has resigned and R. E. BUTLER has been appointed in his place. Mr. Butler was formerly a member of the civil service commission.

WILLIAM H. BARTON, JR., head of the department of civil engineering at Pennsylvania Military College, has been engaged for the summer by the U. S. Bureau of Public Roads as highway research specialist.

PORTER W. MCDONNELL, of Toledo, Ohio, who has been in the employ of Waddell & Hardesty, consulting engineers, New York City, on the construction of the Maumee River high-level suspension bridge at Toledo, has organized Toledo Surveyors, Inc. Mr. McDonnell is president and manager of the new company, which is successor to the long-established firm of Joseph Hofman & Co.

R. P. FORSBERG, principal assistant engineer of the Pittsburgh & Lake Erie Railroad, has been appointed chief engineer of the company. He succeeds A. R. RAYMER, who will devote his entire time to the duties of assistant vice-president after having occupied both positions for several years. Mr. Forsberg has been in the employ of the Lake Erie for the last 39 years.

Obituary

J. RULON MILLER, JR., president of the Empire Construction Co., Baltimore, died suddenly of a heart attack at his summer home on Gibson Island, in Chesapeake Bay, on July 18. Mr. Miller entered business in Baltimore about sixteen years ago and his company has done much important railroad and other construction work in many parts of the country.

JOHN GALEN HOWARD, professor of architecture at the University of California, died of a sudden attack of heart failure in San Francisco on July 18. Prof. Howard, who was born in Chelmsford, Mass., in 1864, was a member of the board of architects of the Pan-American Exposition in Buffalo in 1901 and an advisory member of the reconstruction commission of San Francisco after the earthquake and fire of 1906. He designed a number of the University of California buildings and was the architect for the Newark, N. J., high school, the Majestic Theater, Boston, and the Montclair, N. J., public library.

PHILIP H. DATER, district engineer, U. S. Forest Service, located in Portland, Ore., died on July 12 in San Francisco, where he was attending a meeting of forestry engineers. Mr. Dater was born in Schaghticoke, N. Y., in 1873 and was graduated from Williams College in 1896 and from Massachusetts Institute of Technology in 1898. For

several years he was at Little Falls, N. Y., as resident engineer on Barge Canal construction. In 1914, after having served about a year in the Forest Service, he became city engineer of Portland, Ore., but later returned to the Forest Service.

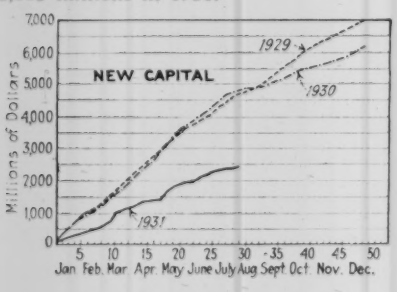
ALBERT G. CARD, of Syracuse, N. Y., died on July 24, aged 49. Mr. Card was chief engineer on the construction of the canal terminal at Syracuse and had been engineer on the construction of sewers and sewage-disposal plants for the villages of East Syracuse and Liverpool. For the past eight years he had been engaged in private practice.

JOHN W. STRACK, pioneer engineer of Spokane, Wash., died in that city on July 10 at the age of 74. Mr. Strack, who was born in Ontario, Canada, went to Spokane in 1883 and engaged in railroad construction work. In 1889, with B. C. Riblet, he platted about half of the city of Spokane. In 1891 he became city engineer and later was county engineer. After two years with the Washington Water Power Co. he went into private engineering work and was engineer for several irrigation projects near Spokane. He continued actively in engineering work almost to the day of his death. His most recent work was the making of preliminary surveys for the new S. H. Kress & Co. building, recently completed.

Capital and Contracts

New capital issued for actual construction throughout July has been at the rate of 42 millions weekly, compared with 63 millions in June and 142 millions for July, 1930. There were several notable issues during the last week, six of which were as follows: Commonwealth Edison Co. 3½s, $20,000,000; Peoples Gas, Light & Coke Co. 3½s, $15,000,000; Public Service Co. of North Illinois 4s, $15,000,000, the foregoing three for plant extension; State of South Carolina 3½s, $5,000,000, highways; Trenton, N. J., 4s, $2,608,000, general improvements and streets; St. Louis County, Mo., 4s, $1,500,000, roads. Cumulatively, this year's total is 2,419 millions, compared with 4,764 millions in the corresponding period of 1930.

Contracts for the four weeks of July have averaged 57 millions weekly, compared with 49 millions in June and 43 millions in July, 1930. Cumulative values are 1,622 millions, compared with 2,065 millions in 1930.



COSTS AND CONTRACTS

ENR Index Numbers

Cost			Volume		
July 1, 1931	**174.37**		**June,**	**1931**	**243**
June 1, 1931	187.37		May,	1931	251
July 1, 1930	200.95		June,	1930	324
Average, 1930	202.85		Average,	1930	260
Average, 1929	207.02		Average,	1929	317
1913	100.00		1913		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of July 30, with some comparisons, total as follows:

(In Thousands of Dollars)

	July 30, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$1,697	$8,916	$8,195
Other	11,890	14,079	13,543
Streets and roads.	15,310	12,181	16,371
Other construction	11,817	22,096	13,428
Total	$40,714	$57,273	$52,288
Total, all classes, Jan. 1 to July 30:			
1931			$1,663,117
1930			2,114,280

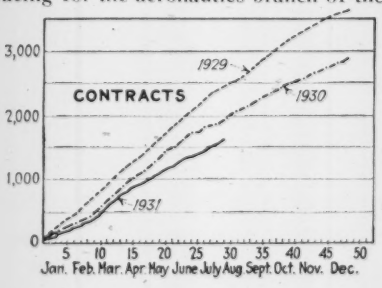
WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Set-Up for Advance Planning of Public Works Nearly Complete—Freight Rate Cases Expedited

FRED E. SCHNEPFE, a civil engineer experienced in advance planning of road construction, and Corrington Gill, economist and statistician, have been appointed by Robert P. Lamont, chairman of the Federal Employment Stabilization Board, to assist Donald H. Sawyer in drafting the program to put the planning of public works on a six-year basis and study the trend of construction activity generally for the purpose of releasing government projects in periods of unemployment. (See *ENR*, July 9 1931, p. 75.) With the appointment of an architect at an early date, the board's staff will be practically complete.

To Mr. Schnepfe has been assigned the work of coordinating the programs of the various government agencies in a continuous six-year cycle so that their plans may be moved forward to provide employment when private construction is at a low ebb. Mr. Schnepfe was recently engaged as a special research engineer on airport drainage and surfacing for the aeronautics branch of the commerce department, but prior to that time, as manager of the Highway Engineering Bureau, consulting engineers, of Washington, D. C., he carried on pioneer research in advance planning of county road construction for the National County Road Planning Commission.



As one of the principal duties of the board is to anticipate any severe lag in private construction, Mr. Gill has been retained to interpret current construction statistics and study economic movements in the building industry in their relation to advance planning.

Hearings on Railroads' Rate Petition Expedited

Hearings on the railroads' petition for a 15 per cent increase in freight rates will conclude several weeks sooner than expected. The railroads put in their evidence in such short order that hearings on the opposition will end rather than begin by Aug. 31, the date originally scheduled. It seems likely now that the case will be in the hands of the Interstate Commerce Commission by Sept. 15 for final decision. Shippers will be heard at hearings beginning in Washington Aug. 10 and in regional hearings scheduled for Aug. 17 in San Francisco and Aug. 31 in Chicago. Evidence in opposition to an increase in rates will be received on intervening dates at Portland, Ore.; New England, Kansas City, Dallas, Salt Lake City, and Atlanta. The exact dates of these hearings, some of which will be held concurrently, will be announced later. Final argument in the case will follow in Washington about ten days after the close of the hearings.

Approximately 200 shippers have asked the commission for time in which to testify that the rates on many commodities, if increased, would be unreasonable or that the high rates would drive more traffic to trucks. It is probable that the chief evidence regarding the effect of higher rates on coal, lumber, non-ferrous metals and miscellaneous traffic will be presented at the hearings in Washington. All parties have been instructed by the commission to make their evidence as concise as possible. No evidence will be received regarding the level of railroad wages or the treatment of individual railroads or minor groups of railroads.

Interest in Salinity Control

As the result of increased interest that is being shown by coastal cities and states in salinity control work in rivers and harbors, special equipment for salt water models will be provided at the national hydraulic laboratory, now under construction at the Bureau of Standards. Arrangements will be made so that a separate circulatory system can be used for supplying salt water. This will permit the setting up of models reproducing the confluence of salt and fresh water exactly as it occurs in any particular locality.

Government engineers are receiving

requests from many sections and localities that desire aid in working out salinity control plans. In the rice-growing sections of southern Louisiana, trouble is experienced with the penetration of sea water to irrigation ditches. Streamflow has been diminished by the drought to such an extent that salt water is drawn up from the Gulf. California has asked for cooperation in designing a salt water barrier to keep sea water from entering the lower Sacramento basin. On the other hand, North Carolina has called upon the war department for help in devising means to increase the salinity of Albemarle Sound. The filling up of inlets to the sound has decreased the salinity, thereby injuring the oyster and fishing industries.

Construction Cost Data in Many Cities, 1929-31

CONSTRUCTION costs decreased 13 per cent during the last year as measured by the *ENR* cost index number. Much larger decreases have been reported from actual practice, up to 40 per cent in the case of certain buildings. Investigation of costs shows considerable variation among contractors in different parts of the country and in different classes of construction.

In Chicago one contractor states that steel erected costs 10 per cent less than it did a year ago and 25 per cent less than two years ago; another local contractor gives 12 and 2 per cent respectively. In paving, two cities report practically no change in the last two years, while contractors in other cities show reductions running to more than 40 per cent for excavation and 20 to 36 per cent for paving. Amarillo, Tex., reports practically no change in sewer and water construction, but in other cities sewers are 20 to 37 per cent below and water mains 5 to 20 per cent below 1930.

TABLE I—LABOR EFFICIENCY ESTIMATED BY CONTRACTORS

For the five years 1927-1931; 1926 taken as 100

Locality	Labor Output Per Man-Hour 1927	1928	1929	1930	1931
Massachusetts town	80	75	71	105	108
Upstate New York	100	100	90	110	110
West Virginia	100	100	125	125	125
Chicago	100	100	105	120	125
Nebraska	100	100	100	110	125
New Jersey	100	100	100	100	105
Average	97	96	98	112	116

The general average of all the data gathered in the investigation shows *a reduction of 13 per cent from a year ago and 20 per cent from the summer of 1929.*

Factors of Cost Decrease

Actual wages currently being paid and the difference between these and official or union scale rates are discussed in the issues of June 4, 11 and 18, and July 9. The difference between actual wages in the principal trades and scale rates in per cent is (scale rates generally are the same as a year ago): carpenters, 20 per cent; bricklayers, 19; plasterers, 18; ironworkers, 17; common laborers, 26; average, 20 per cent. In addition, labor costs are further reduced by a decided increase in productivity—that is, more output per man-hour.

Figures on Increased Efficiency

As far back as a year ago contractors were talking about the increased efficiency of their forces. Estimates of the amount of this improvemnt have been obtained from a number of contractors. Table I presents figures. Taking labor output in 1926 as 100, the figures for the years 1927 to 1931 inclusive are: 97, 96, 98, 112, 116. Thus labor productivity has risen 6 per cent in the last year and is now 20 per cent higher than it averaged during 1926 to 1929.

Present Prices of Materials Also Low

Materials prices show the same trend as labor costs. The monthly figures of quotations of manufacturers and producers published by *Engineering News-Record* show materials to be 10 to 15 per cent below last year's prices. Cement, of course, has broken abnormally, mill quotations now averaging $1.32 per barrel, against $1.80 a year ago, a drop of 27 per cent. A recent study of prices actually being paid for materials by contractors indicates that these monthly quotations provide an accurate gage of the market in general, but in a few cities actual prices are 10 to 15 per cent below quotations.

Representative Unit Cost Data

Unit costs on representative operations in highway work and building and sewer and water construction, contributed by contractors in a number of cities, are compiled in Table II, covering the years 1929, 1930 and 1931. The decreases for 1931 from 1930 and 1929 are summarized separately in Table IV.

TABLE II—CONTRACTORS' UNIT CONSTRUCTION COSTS

Boston, Mass.

Highway	Summer of 1929	1930	1931
Earth excavation, cu.yd.	$0.60	$0.50	$0.35
Concrete, cu.yd.	14.00	12.00	9.00
Asphalt, sq.yd.	.80	.60	.50
Building Construction			
Steel, erection cost	20.00	20.00	14.00
Common brick, cost in place, per M.	45.00	40.00	35.00
Cinder concrete fireproofing, beams and columns per sq.ft.	9.00	9.00	8.00
Cinder concrete floor arches per cu.yd. without forms	9.00	9.00	8.00
Stone concrete in reinf.-conc. buildings per cu.yd. without forms	14.00	12.00	10.00
Floor forms, sq.ft.	.15	.15	.12
Sewers—Vit. tile in place, lin.ft.	.85	.75	.62½
Concrete in place, lin.ft.	.90	.80	.65
Water mains—Cast-iron in place, lin.ft.	2.50	2.25	2.00
Steel in place, lin.ft.	2.25	2.15	1.85

Trenton, N. J.

Highway	Summer of 1929	1930	1931
Excav., cu.yd.	$0.70	$0.60	$0.40
Concrete, sq.yd.	2.75	2.60	2.15
Asphalt, sq.yd.	1.75@2	2.00	1.48@1.60
Building Construction			
Steel, cost erected			100.00
Common brick	45.00	45.00	37.00
Concrete fireproofing	9.00	9.00	8.00
Concrete floor arches	9.00	9.00	8.00
Concrete in buildings	12.00	12.00	10.00
Floor forms	.15	.15	.12
Sewers—8-in. vit. tile	1.00	.90	.85
Water mains—Cast-iron	2.50	2.25	2.00

Charleston, W. Va.

Highway	Summer of 1929	1930	1931
Excav.	$0.57	$0.45	$0.30
Concrete, 7 in.	13.75	11.80	8.75
Asphalt, 2 in.	.75	.60	.48
Building Construction			
Steel, cost to erect	20.00	20.00	15.00
Common brick	40.00	40.00	37.00
Concrete fireproofing	9.00	9.00	8.00
Concrete floor arches	9.00	9.00	8.00
Concrete in building	13.00	13.00	11.00
Floor forms	.15	.15	.12
Sewers—Vit. tile	.85	.75	.60
Concrete	.89½	.79½	.63
Water mains—Cast-iron	2.50	2.25	2.00
Steel	2.25	2.00	1.75

Auburndale, Mass.

Building Construction	Summer of 1929	1930	1931
Steel, cost erected	$90.00	$92.50	$84.00
Common brick	44.00	43.00	42.00
Cinder concrete floor arches	7.50	7.50	6.75
Stone concrete	8.00	7.50	6.50
Floor forms	.20	.19	.14

Syracuse, N. Y.

Highway	Summer of 1929	1930	1931
Excav.	$0.58	$0.48	$0.42
Asphalt, 3-in. on 8-in. conc. base, sq.yd.	2.80@3.20	2.60@2.90	2.30@2.50
Building Construction			
Steel, cost erected	95.00	95.00	75.00
Common brick	40.00	40.00	40.00
Concrete fireproofing	.30	.30	.30
Concrete floor arches	6.00	8.00	8.00
Concrete in buildings	9.00	9.00	9.00
Floor forms	.20	.20	.20

Nashville, Tenn.

Highway	Summer of 1929	1930	1931
Excav.	$0.334	$0.315	$0.28
Concrete, 6½-in., sq.yd.	1.768	1.737	1.60
Asphalt, 1½-in., sq.yd.	0.995	0.832	0.80
Building Construction			
Steel, cost erected	95.00	85.00	70.00
Common brick	38.00	35.00	28.00
Concrete in building	13.00	11.00	9.75
Floor forms	0.11	50.11	0.10

Chattanooga, Tenn.

Highway	Summer of 1929	1930	19
Excav.	$0.52	$0.47	$0
Concrete, cu.yd.	10.80	9.50	9
Asphalt	0.80	0.70	0.5
Building Construction			
Steel, erection cost	21.00	19.50	19.00
Common brick	35.00	32.50	32.50
Concrete fireproofing	10.00	9.00	9.00
Concrete floor arches	9.00	8.50	8.50
Concrete in buildings	15.00	14.00	13.00
Floor forms	0.17	0.15	0.14
Sewers			
Vit. tile	0.80	0.70	0.60
Concrete	0.90	0.80	0.70
Water Mains			
Cast-iron	2.60	2.25	2.10
Steel	2.40	2.10	1.85

Birmingham, Ala.

Highway	Summer of 1929	1930	1931
Sheet asphalt, 6-in	$1.76	$1.64	$1.62
Asphaltic conc., 6-in	1.42	1.46	1.32
Building Construction			
Steel, cost erected	93.00	81.00	73.00
Common brick	30.00	26.50	22.00
2-in. hollow tile fireproofing	0.27	0.25	0.21
Concrete floor arches	16.00	14.00	12.00
Concrete in buildings	12.00	10.00	8.00
Floor forms	0.16	0.13	0.08
6-in. cast-iron pipe in place, lin.ft	1.00	0.98	0.92

Amarillo, Tex.

Highway	Summer of 1929	1930	1931
Earth excav., cu.yd	$0.50	$0.43	$0.37
Concrete, 6-in., sq.yd	2.75	2.40	2.25
Asphalt, 1½-in., sq.yd	0.60	0.50	0.50
Building Construction			
Steel, cost erected	90.00	75.00	62.00
Common brick	36.00	32.00	30.00
Concrete in buildings	8.55	8.00	6.90
Floor forms	0.15	0.12	0.10
Sewers			
8-in. vit. tile	0.96	....	0.90
10-in. vit. tile	1.10	....	1.05
Water Mains			
2-in. cast-iron	0.54	....	0.50
4-in. cast-iron	1.03	....	1.28
6-in. cast-iron	1.45	....	1.63

Canton, Ohio

Building Construction	Summer of 1929	1930	1931
Steel, cost erected	$60.00	$60.00	$54.00
Common brick	32.00	32.00	25.00
Sewers			
6-in. vit. tile, 8 ft. deep	1.15	1.00	0.75
Water Mains			
6-in. cast-iron, 4 ft. deep	1.60	1.60	1.50

St. Louis, Mo.

(Average costs of numerous contractors)

Building Construction	Summer of 1929	1930	1931
Steel, erection cost	$27.00	$25.00	$22.00
Common brick	45.00	42.00	38.00
Concrete in buildings	10.00	9.00	8.00
Floor forms	0.24	0.20	0.18

Chicago, Ill.

Highway	Summer of 1929	1930	1931
Earth excav., cu.yd	$0.90	$0.35	$0.32
Concrete, sq.yd	2.42	2.05	1.95
Building Construction			
Steel, cost erected	78.40	70.03	68.90
Common brick	39.20	36.40	35.72
Concrete in buildings	8.85	8.05	7.90
Floor forms	0.31	0.27½	0.25
Sewers			
8-in. vit. tile, 12 ft. deep	(1) 1.23	(2) 1.35	(3) 0.85
Water Mains			
6-in. cast-iron, 5½-ft. cover	1.85	1.63	1.55

(1) Sand, gravel excav., cement and oakum joint.
(2) Wet sand and clay, asphalt joint, not poured.
(3) Sand, gravel, some clay, asp. joint, not poured.

Milwaukee, Wis.

Highway	Summer of 1929	1930	1931
Excav	$0.35	$0.26	$0.28
Concrete, 8-in	2.00	1.74	1.60
Building Construction			
Steel, erection cost	....	....	$20.00
Common brick	....	....	36.00
Concrete fireproofing	....	....	6.25
Concrete floor arches	....	....	6.25
Concrete	....	....	8.00
Floor forms	....	....	0.10
Sewers			
8-in. vit. tile, 8 ft. deep	1.65	1.70	1.10
Water Mains			
8-in. cast-iron	2.71	2.50	2.25

Duluth, Minn

Building Construction	Summer of 1929	1930	1931
Steel, cost erected	$90.00	$85.00	$80.00
Common brick	38.00	37.00	36.00
Concrete in buildings	9.20	9.10	9.00
Floor forms	0.14	0.13	0.12

Sioux City, Iowa

Highway	Summer of 1929	1930	1931
Excav	$0.35	$0.30	$0.25
Concrete, 10-7-10 in	2.25	2.25	2.00
Building Construction			
Steel, cost to erect	15.00	15.00	11.00
Common brick	32.50	32.50	32.50
Concrete in buildings	10.50	9.75	8.10
Floor forms	0.18	0.17	0.15
Water Mains			
6-in. cast-iron pipe in place, lin.ft	1.60	1.55	1.40

Lincoln, Neb.

Highway	Summer of 1929	1930	1931
Excav	$0.25	$0.18	$0.12 -$0.14
Concrete, 9-6½-9 in	1.65	1.50	1.30
Asphalt, 5-in. base and 2-in. wear cost	2.40	2.25	2.00
Sewers			
8-in. vit. tile	0.80	0.75	0.60
8-in. concrete	0.80	0.75	0.60
Water Mains			
4-in. cast-iron	0.80	0.75	0.70

Salt Lake City, Utah

Highway	Summer of 1929	1930	1931
Excav	$0.335	$0.21	$0.20
Unclassified excav	0.560	0.348	0.351
Concrete, 9-6-9-in	1.45	1.31	1.24
Building Construction			
Steel, cost erected	120.00	100.00	85@90
Common brick	40.00	35.00	32.00
Concrete in buildings	11.00	9.00	8.00
Floor forms	0.25	0.20	0.20
Sewers			
8-in. vit. tile	0.67	0.58	0.60
4-in. vit. tile	0.35	none	0.31
8-in. concrete	none	0.57	none
Water Mains			
4-in. cast-iron	0.74	0.69	0.64
6-in. cast-iron	0.95	0.92	0.87

TABLE III—ROAD CONSTRUCTION BIDS

Canton, Ohio

	1929	1930	1931
Excav., cu.yd	$0.40–$0.45	$0.35–$0.40	$0.30–$0.35
Conc. pav., 9-7-9-in., sq.yd	1.60–2.00	1.40–1.75	1.30–1.50
Asphalt, 3-in., sq.yd	1.40	1.30	1.20

Youngstown, Ohio

Excavation	$0.30	$0.30	$0.22
Concrete, 8-in	2.35	1.95	1.60
Asphalt, 3-in	1.40	1.32	....

Topeka, Kan.

Excavation	$0.2833	$0.2172	$0.1997
Concrete, 9-6-9 in	2.013	.933	1.787

Tulsa, Okla.

Excavation	$0.50	$0.70	$0.70
Concrete, 7-in	2.10–2.25	2.25	2.20

Montgomery, Ala.

Excavation	$0.28	$0.28	$0.23
Concrete, 9-6-9 in	1.60	1.55	1.50

Minnesota

(Average on state highways)

Excavation	$0.32	$0.246	$0.222
Concrete, 9-7-9 in	1.298	1.295	1.216

Urbana, Ill.

Excavation	$0.40	$0.30	$0.20
Concrete, 9-6-9 in	1.40	1.20	1.00

Knoxville, Tenn.

(Average on city streets and sewers)

Excavation	$0.35	$0.50	$0.40
Concrete, 6-in	1.24	1.51	1.50
Asphalt, 2-in	0.67	none used	
Sewers, 8-in. concrete, 4-6 ft. deep	0.57	0.70	0.75
Sewers, 12-in. concrete, 4-6 ft. deep	0.85	0.95	1.00

Anderson, Ind.

Excavation	$0.60	$0.50	$0.38
Concrete, cu.yd	15.00	13.00	10.00
Asphalt	0.80	0.65	0.50

Portland, Ore.

Earth excavation	$0.34	$0.39	$0.38
Loose rock	0.49	0.48	0.46
Solid rock	0.94	0.92	0.98
Concrete, 7-in	1.87	1.54	1.80
Asphalt concrete, top 1½-in. on 7-in	1.35	1.34	1.35
Vitrified and concrete tile			
6-in	0.46	0.375	0.38
8-in	0.71	0.69	0.65
10-in	0.90	0.92	0.92
12-in	1.10	1.12	1.13
18-in	3.09	2.52	2.55
24-in	4.18	3.76	3.80
30-in	6.00	6.05	6.09
36-in	6.97	6.90	6.95

TABLE IV—CONSTRUCTION COST DECREASE FOR 1931 FROM 1929 AND 1930, PER CENT

	Auburndale, Mass.		Syracuse, N. Y.		Charleston, W. Va.		Amarillo, Tex.		Chicago, Ill.		Lincoln, Neb.		Trenton, N. J.		Nashville, Tenn.		Duluth, Minn.	
	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Highway																		
Earth excav.	..	..	28	12	47	33	26	14	..	9	48	28	35	24	16	11	..	..
Concrete paving	..	..	..	..	36	26	18	6	19	5	21	13	22	18	10	8	..	..
Asphalt paving	..	..	20	13	36	20	17	..	..	..	17	11	18	23	19	4	..	..
Building																		
Steel	7	9	21	21	25	25	31	17	25	10	..	..	..	..	26	18	11	6
Common brick	5	7	..	..	8	8	17	6	9	2	..	..	18	18	26	20	5	3
Floor arches	10	10	..	..	11	11	..	..	..	..	..	..	11	11	..	..	..	..
Concrete	19	13	..	..	15	15	19	13	11	2	..	..	11	11	25	11	2	1
Forms	30	27	..	..	20	20	33	17	19	9	..	..	20	20	15	11	14	8
Sewers	..	..	33	23	29	20	6	..	31	37	25	20	15	6	..	..	..	..
Water mains	..	..	15	15	20	11	..	..	16	5	13	7	20	11	..	..	..	..
Average	14	13	22	16	25	19	21	12	23	13	25	16	19	16	20	12	8	5

	Canton, Ohio		Youngstown, Ohio		Topeka, Kan.		Tulsa, Okla.		Montgomery, Ala.		Sioux City, Iowa		Urbana, Ill.		Anderson, Ind.		Knoxville, Tenn.		Portland, Ore.	
	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Earth excav.	23	13	27	27	29	8	..	0	18	18	29	17	50	33	37	24	+14	20	+12	3
Concrete paving	22	10	32	18	11	7	0	2	6	3	11	11	29	17	33	23	+21	1	4	+17
Asphalt paving	14	8	..	..	..	..	1	0	..	..	..	..	..	..	39	23	..	..	..	..
Average	20	10	30	22	20	7	1	1	12	10	20	14	40	25	36	23	..	..	..	..

	Boston, Mass.		Birmingham, Ala.		Chattanooga, Tenn.		Canton, Ohio		Milwaukee, Wis.		St. Louis, Mo.		Sioux City, Iowa		Salt Lake City,	
	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Highway.																
Earth excav.	42	30	....	....	29	21	....	....	20	+7	....	....	29	17	40	5
Concrete paving	36	25	....	....	12	0	....	....	20	8	....	....	11	11	14	5
Asphalt paving	37	17	7	10	31	21	....	....	....	....	....	....	....	....	....	....
Building																
Steel	30	30	22	10	10	3	10	10	....	....	18	12	27	27	27	13
Common brick	22	13	27	17	7	0	22	22	....	....	26	10	0	0	20	9
Floor arches	11	11	22	16	10	0	....	....	....	....	....	....	....	....	....	....
Concrete	11	11	23	20	6	0	....	....	....	....	20	11	23	17	27	11
Forms	29	17	50	38	13	7	....	....	....	....	25	10	17	12	20	0
Sewers	26	17	....	....	25	14	35	25	33	35	....	....	....	....	11	0
Water mains	20	11	8	6	19	7	6	6	17	10	....	....	....	....	13	7
Average	26	18	23	17	16	7	18	16	22	12	22	10	18	14	22	8

Construction Equipment and Materials

Trade-In Allowances Discussed by Equipment Distributors

Trade practices, especially those concerned with trade-in allowances on used equipment, were discussed at length at the semi-annual meeting of the executive committee of the Associated Equipment Distributors held at Chicago on July 16 and 17. Representative manufacturers of construction equipment and general contractors met with the committee and contributed their views to the discussion. A committee is to be appointed by the president to study the characteristics of the dealer business with a view to recommending measures that will relieve the unhealthy conditions growing out of unwise trade practices.

Overlapping Cast-Iron Plates Form Heavy-Duty Roof

A system of cast-iron plate roofing for heavy-service roofs, primarily for industrial applications where heat and corrosive action are factors, has just been brought out by the U. S. Pipe & Foundry Co., Burlington, N. J. Two years of development preceded the commercial announcement, in the early part of which period a section of roofing was placed on one of the company's plant buildings for a service test. The present appearance of this roof plate is shown in Fig. 1. As finally developed, the roofing plates are of the same external form as those used in the test roof, but some of the details and production practices have been improved. Standard-size plates are 2 ft. wide and 4 ft. 4 in. long, weighing 78 lb. Twelve of these will cover 100 sq.ft. of roof. Along the middle of each plate extends a semi-cylindrical rib merging into the flat body a short distance below the top. The two lateral edges of the plate have an upward extending flange 1 in. high from end to end. A stop is provided at either side of the top edge to hold the plate in place on the roof purlins and to prevent plate movement.

The 1-in. longitudinal space between adjacent plates is covered by a semi-cylindrical casting known as the cap plate, whose lower side has a lug near the bottom end which passes down between the edges of the two roofing plates and receives a wedge key passing under the top flange of the I-beam or channel purlin on which the plate rests. This key locks the strip securely in place and holds the two adjoining plates in fixed position. As the key constantly tends to tighten by gravity action, the locking effect is secure. Cap plates are 52x3⅜ in., and weigh 12 lb. each.

The second course of plates is staggered, the middle rib lapping over the capping strip at the joint of the plates in the course below. At the same time the lower edge of the upper course, locked by its key to the purlin, holds down the upper end of the lower course.

All plates are of ⅜-in. thickness throughout. By virtue of this uniformity of thickness and the pouring procedure they come out of the mold without distortion or warping. The gross weight of the roofing as laid is 10.8 lb. per square foot. The roofing is claimed to have high strength (more than 400 lb. per square foot in a load test, with ¾-in. ultimate deflection), and the advantage of the well-known corrosion resistance of cast iron.

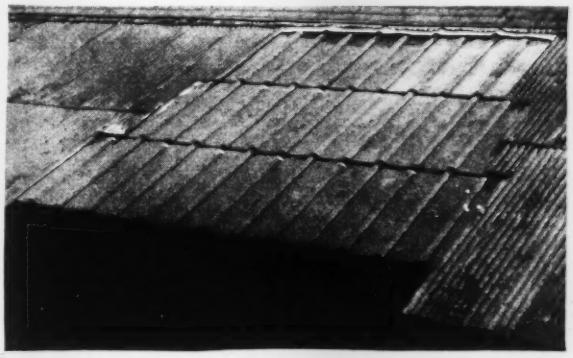


Fig. 1—Test roof of cast-iron plates

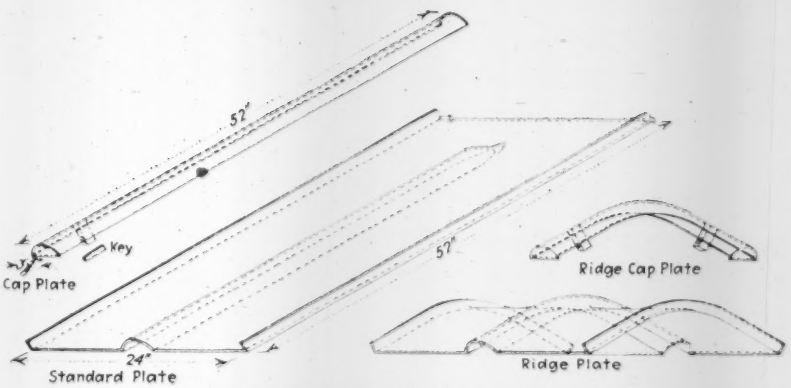


Fig. 2—Elements of roofing assembly

Carrier for Gas Cylinders

Short-distance transportation of heavy gas cylinders, always an awkward problem, is simplified by a new patented device offered by the Carbo-Oxygen Co., Benedum Tree Building, Pittsburgh, Pa. This takes the form of a two-man carrier that is readily adjustable to any type of compressed air cylinder, including oxygen, hydrogen and acetylene. It is constructed of steel tubing with four steel adjustable hooks, and has ample strength for carrying the heaviest cylinders.

Carrying device for gas containers

Self-Priming Centrifugal Pump

No valves, vacuum pumps, air compressors, foot valves or other priming devices are used on the new type of self-priming centrifugal pump just announced by the Novo Engine Co., Lansing, Mich., in 3-, 4- and 6-in. sizes with capacities ranging from 400 to 1,400 g.p.m. The self-priming feature, which is built into the pump, makes it a completely self-contained unit capable of priming itself whenever necessary at all suction lifts up to and including that attained by a standard centrifugal pump. Ports and passageways are so arranged that the priming water cannot be thrown out through the discharge, but will circulate until it has expelled the air from the suction pipe. When first started, it is necessary to fill the pump case with water, but after this the proper level is maintained at all times whether the pump is handling water or air or is entirely stopped. The unit will handle a considerable amount of air continuously, but should the water get below the inlet of the suction hose, it will simply stop pumping water until the suction pipe is again covered, when it will pick up its prime and continue operation without any attention.

The steel impeller is of the open type, making it possible to handle water containing sand, gravel, mud or silt without

(Continued on page 198)

Current Construction Unit Prices

Close Bids on Broad St. Subway, Contract 205, Philadelphia

CONTRACT 205 covers construction of 7,285 lin.ft. of two-track subway in Broad St., Philadelphia, from the present southern terminus at Kater St. to south of Snyder Ave., and includes three passenger stations of the island-platform type and an underpass for future turnout at Passyunk Ave. The contract involves the support and protection of the Pennsylvania Railroad track structure crossing Broad St. at Washington Ave., and the support, maintenance and protection of surface-car tracks crossing Broad St. at several points, all without interference with traffic.

This section of the subway is to be constructed on the east side of Broad St., with provision for two future tracks on the west side of the street. On this account the stations are of the mezzanine type of construction, requiring an average

TABLE I—TABULATION OF MAJOR ITEMS

For names of bidders, see Table II

Approx. Quantities	A	B	C	D	E	F	G	H	I	J	Avg.
260,000 cu.yd. subway excav.: (A) above El. zero	4.77	3.25	4.65	4.29	4.60	4.95	3.78	3.83	3.83	4.10	4.21
136,000 cu.yd. subway excav.: (B) below El. zero	4.05	3.25	4.65	3.00	4.90	4.95	3.78	3.83	3.83	5.50	4.17
10,000 cu.yd. excav. for pipes, sewers, conduits etc.	4.00	2.00	5.00	4.00	3.00	5.00	3.00	3.50	2.55	1.00	3.31
1,000 cu.yd. removing pavement, excav. and grade	3.30	2.00	5.00	3.00	3.00	4.35	3.00	3.75	1.90	1.00	3.03
4,300 ft. of front underpinning buildings 5 stories or less	25.00	37.00	50.00	30.00	40.00	20.00	38.00	31.00	25.00	10.00	31.00
40,000 cu.yd. concrete 1:2:3	14.00	13.00	12.50	13.00	14.90	14.00	14.00	14.15	13.50	14.00	13.50
30,000 cu.yd. concrete 1:2:4	14.07	12.50	12.00	13.50	15.40	14.00	14.00	14.15	13.50	13.00	13.60
1,850 cu.yd. concrete 1:3:6	14.00	11.00	14.00	12.00	14.60	15.00	14.00	11.75	13.00	10.00	13.00
800 cu.yd. concrete 1:3:6 base course for paving	10.50	9.00	10.50	8.50	10.00	11.00	10.00	11.00	6.00	6.00	9.00
8,800 sq.yd. granolithic finish: without abrasive wearing surface	1.00	1.50	1.25	1.25	1.00	1.00	1.00	1.00	.90	.75	1.05
1,500 sq.yd. granolithic finish: with abrasive wearing surface	1.60	1.00	1.50	1.50	1.50	1.35	1.25	1.25	1.50	.85	1.33
21,500 sq.yd. rubbing surface of concrete	.50	.40	.90	.45	1.00	.60	.45	.80	.50	.35	.60
800 cu.yd. brick masonry	25.00	30.00	30.00	25.00	30.00	25.00	30.00	31.00	25.00	35.00	29.00
600 cu.yd. hollow terra-cotta brick or tile masonry	23.00	25.00	35.00	20.00	30.00	25.00	30.00	31.00	15.00	10.00	24.00
1,200 sq.yd. vitrified shale brick sewer lining	3.50	3.00	3.50	3.00	3.00	3.75	4.00	3.50	4.50	3.50	3.50
Vitrified Clay Pipe											
1,000 lin.ft. 4-in. pipe	.35	.20	.28	.30	.40	.30	.40	.28	.25	.35	.30
4,500 lin.ft. 5-in. or 6-in. pipe	.50	.25	.38	.40	.60	.40	.50	.45	.40	.50	.44
1,000 lin.ft. 8-in. or 10-in. pipe	.70	.70	.56	.60	.70	.65	.75	.60	.90	1.00	.72
800 lin.ft. 12-in. pipe	.80	1.00	1.15	.75	1.00	.90	1.00	.80	1.30	1.00	1.00
11,500 lin.ft. 15-in. pipe	1.00	1.75	1.40	1.25	1.50	1.40	1.20	1.50	1.65	1.50	1.40
2,500 lin.ft. 20-in. pipe	2.00	3.00	2.75	2.00	2.50	2.50	2.25	2.50	2.50	2.50	2.45
5,000 lin.ft. 24-in. channel pipe	3.00	3.50	3.25	3.00	2.50	3.00	3.00	3.30	2.50	2.75	3.00
1,500 lin.ft. extra heavy cast-iron soil pipe 2-in.	.45	.30	.30	.30	.40	.40	.40	.40	.75	.50	.40
500 lin.ft. extra heavy cast-iron soil pipe 3 in.	.65	.45	.80	.45	.60	.55	.60	.55	1.00	.60	.60
19,500 lin.ft. extra heavy cast-iron soil pipe 4-in.	.75	.75	1.00	.75	.80	.75	1.00	.70	1.30	1.00	.90
50 new sewer manholes	110.00	100.00	125.00	100.00	140.00	115.00	125.00	120.00	130.00	100.00	115.00
12,000 sq.yd. asphalt mastic waterproofing	1.45	1.50	1.75	1.40	1.70	1.40	1.60	1.60	1.75	1.40	1.55
22,000 sq.yd. fabric waterproofing: 3-ply	1.10	1.20	1.50	1.10	1.35	1.00	1.35	1.30	1.70	1.05	1.25
100 cu.yd. brick in waterproofing compound	50.00	43.00	50.00	50.00	50.00	40.00	50.00	40.00	25.00	10.00	40.00
280,000 lb. riveted structural steel	.04	.05	.056	.05	.04	.045	.04	.0428	.05	.04	0.45
11,500,000 lb. structural steel beams and shapes	.04	.04	.04	.03	.04	.035	.04	.0428	.045	.045	.40
5,300 sq.ft. steel ventilation gratings: 2½ in. depth, with frames	2.00	2.25	2.30	2.00	2.00	2.10	2.50	1.90	2.00	1.75	2.10
11,000 lb. miscellaneous steel or wrought-iron for ladders, stairs, etc.	.20	.17	.20	.20	.16	.15	.17	.15	.15	.10	.17
190,000 lb. tie rods, bolts, nuts, washers, dowels and anchor bolts	.05	.10	.08	.10	.07	.06	.10	.064	.05	.035	.07
19,000 lb. steel wire lath and anchors	.30	.15	.14	.20	.25	.15	.20	.15	.20	.10	.18
3,500,000 lb. deformed steel reinforcing rods	.04	.05	.04	.03	.04	.031	.04	.0425	.03	.03	.035
200 ton interlocking steel sheetpiling	60.00	80.00	80.00	60.00	70.00	90.00	75.00	75.00	85.00	125.00	80.00
100 vert. ft. steel pipe piles: 12-in.	4.00	10.00	6.00	5.00	14.00	8.00	9.00	7.00	9.00	15.00	8.70
200 vert. ft. steel pipe piles: 15-in.	6.25	12.00	7.00	6.00	15.00	9.00	10.00	9.00	10.00	18.00	10.20
2,000 lb. wrought-iron pipe	.15	.14	.20	.15	.15	.12	.15	.15	.13	.07	.14
32,000 lb. 3½-in. wrought-iron pipe for electrical conduits	.15	.14	.15	.15	.15	.15	.15	.15	.14	.16	.15
500 lb. steel pipe, except for water mains, any size, with fittings	.10	.12	.15	.10	.15	.12	.15	.12	.13	.03	.12
4 emergency exit doors	700.00	550.00	600.00	575.00	475.00	500.00	500.00	500.00	600.00	600.00	565.00
27,000 lb. cast-iron frames and covers for manholes	.06	.06	.08	.05	.06	.08	.06	.06	.05	.05	.06
10,000 lb. misel. iron castings other than manhole frames and covers	.10	.09	.12	.08	.10	.08	.10	.08	.08	.08	.09
100,000 b.m. lumber in place	80.00	65.00	80.00	75.00	30.00	80.00	80.00	70.00	60.00	10.00	63.00
1,200 net ton cast-iron pipe, furnished bell and spigot straight	40.00	40.00	63.00	40.00	40.00	40.00	43.00	45.00	23.00	30.00	40.00
70 net tons cast-iron pipe, furnished bell and spigot specials	110.00	120.00	175.00	130.00	125.00	120.00	125.00	130.00	150.00	70.00	125.00
60,000 lb. furnishing and laying steel water pipe	.12	.05	.25	.15	.07	.15	.08	.12	.08	.05	.12
8,000 lin.ft. laying bell and spigot cast-iron pipe 6 in.	.60	.55	1.00	.30	.70	.60	.50	.60	.75	.10	.57
5,000 lin.ft. 20 in.	1.60	1.60	2.35	1.50	3.25	1.50	1.60	1.75	1.00	.50	1.65
2,000 lin.ft. 30 in.	2.50	2.50	3.75	2.50	3.75	3.50	2.50	3.00	1.00	.75	2.60
2,000 lin.ft. 48 in.	4.00	5.00	10.50	3.50	6.00	5.75	5.00	5.00	1.00	.80	4.70
1,200 net ton removing cast iron pipe	10.00	10.00	15.50	10.00	15.00	13.00	10.00	10.00	1.00	1.00	9.00
1,000 lin.ft. new lead water service connections ¾ in.	4.50	2.10	2.00	1.05	1.80	1.65	1.25	1.10	2.50	3.50	2.15
1,000 lb. brass water pipe, iron pipe size, ¾ to 1¼-in.	2.00	.65	.75	.50	.80	.60	.70	.50	.90	.50	.80
350,000 duct ft. vitrified clay ducts 3½-in.	.20	.15	.25	.23	.25	.20	.20	.22	.15	.18	.20
500 duct ft. 3½-in. fibre ducts	.25	.25	.50	.25	.30	.30	.25	.25	.25	.05	.25
45,000 lin.ft. galvanized standard steel pipe electrical conduit 1-in.	.25	.20	.33	.20	.20	.20	.22	.20	.25	.11	.22
3,000 lin.ft. galvanized standard steel pipe electrical conduit	.40	.35	.50	.30	.30	.33	.40	.30	.40	.18	.35
1,000 lin.ft. galvanized standard steel pipe electrical conduit 2-in.	.60	.50	1.00	.40	.40	.43	.60	.45	.50	.23	.51
Temporary lighting systems	10,000.00	7,000.00	8,000.00	6,000.00	10,000.00	6,000.00	7,000.00	12,500.00	6,000.00	4,000.00	7,900.00
1,000 lin.ft. 3-in. creosoted wood conduit	.25	.35	.50	.30	.35	.45	.40	.40	.40	.10	.40
2,500 sq.yd. sheet asphalt pavement	1.50	1.50	2.00	1.30	2.00	1.90	1.75	2.00	1.30	.75	1.60
1,700 sq.yd. smooth dressed granite block pavement	5.00	5.00	6.00	5.00	5.00	5.00	5.50	5.50	5.00	3.00	5.00
45,000 sq.yd. for furnishing and laying new granite blocks (temp.)	4.25	4.50	5.50	4.00	4.74	4.00	4.50	5.00	4.00	4.35	4.50
500 sq.yd. for relaying old granite blocks	1.00	1.25	2.00	.75	.60	1.00	1.00	1.00	1.30	.50	1.05
4,000 lin.ft. resetting curb	.50	.50	.75	.75	.40	1.00	.60	.46	.65	.50	.60
20,000 sq.yd. new granolithic sidewalk	1.75	2.25	2.50	2.00	2.10	1.85	2.00	2.10	1.00	.75	1.85
2,700 sq.ft. safety threads	3.00	2.25	2.75	3.50	3.00	2.50	2.50	2.50	2.50	2.50	2.70

Total bids are given in Table II.

Current Construction Unit Prices

depth of 34 ft. for the subway excavation, with a maximum of 52 ft. This portion of the subway passes through filled ground for a large part of its length, and it is expected that a considerable amount of groundwater will be encountered. The contract has been awarded to Jafolla & Mark, Inc., of Philadelphia, and construction by trench excavation under cover is now under way.

TABLE II—THE TEN BIDDERS

B. Jaffola & Mark, Inc., 2820 N. 21st St.	$3,885,629
D. Francis A Canuso & Son, 804 S. 12th St.	3,923,925
I. Henry W. Horst Co., 1505 Race St.	4,013,818
J. Joseph & Robert Lombardi, 715 Real Estate Trust Bldg.	4,165,188
G. McNichol Paving & Construction Co., 1923 Cherry St.	4,206,548
H. Arundel Corp., Pier 2, Pratt St., Baltimore	4,282,640
A. Keystone State Corp., Philadelphia Bank Bldg.	4,399,769
F. Mandel Golder, as Golder Constr. Co., Market St. Nat. Bk. Bldg.	4,453,387
E. Seeds & Derham, 25 Maplewood Ave.	4,692,711
C. Di Marco & Reimann, Inc., Jerome Ave. and 192th St., New York	4,712,202
Average total bid	$4,273,582

Decking operations are confined to one city block at a time. In each block the contractor removes the paving from the center line to the easterly curb, continuous traffic being maintained on the other half of the roadway from 7 a.m. to 7 p.m. From 7 p.m. to 7 a.m. the contractor may remove additional portions of the street surface on the westerly side of Broad St., but he must maintain a 24-ft. width of pavement for three lanes of traffic. Where the surface on the west side of Broad St. is removed while the east side of the street remains open, the opening is decked over so that traffic over the west side may be resumed by 7 o'clock the following morning. Broad St. is paved with asphalt on a concrete base. As fast as the subway structure is completed, the excavation is backfilled to within 5 ft. of the surface without complete removal of the decking. Beyond this level decking on one side of Broad St. is removed and the street backfilled to subgrade and temporarily repaved with granite blocks on a sand bed 3 in. thick with sand joints.

The first five items are for excavation and include disposal of all materials, and sheeting, shoring and pumping. As in the case of the total bid, these unit prices are closely comparable for work of this nature. The next three items are for underpinning, and cover buildings five stories or less, more than five and less than ten stories, and additional masonry.

Ten bids were received, and the bidding was remarkably close. The low bid was $3,885,629, only $36,000 below the second bid, 17 per cent below the high and 8 per cent below the average. The tabulation gives the major unit prices and the average of the ten prices on each item. The first two items, for subway excavation, include cost of decking, support and protection of underground structures, the removal of materials, and the handling of water. They amount to one-third of the total cost. The contract price of $3.25 per cubic yard compares with $6 and $7.30 for similar work on Ridge Ave. and Eighth St., on which work started early in 1930. It may be compared also with the price of $9.50 for subway construction on South Broad St., immediately north of this contract, commenced in the latter part of 1927.

"The close agreement," says C. H. Stevens, chief engineer of the department of city transit, "between the bids for the concrete masonry items may be partly due to the fact that we are now using concrete from a central mixing plant, and the prices quoted to the various bidders were presumably the same. The items for steel work are likewise affected by the fact that practically all this steel comes from either the Bethlehem Steel Co. or the American Bridge Co."

Laying Cast-Iron Pipe

BIDS were received June 3 at Canajoharie, N. Y., for laying 8 miles of 10-in. and 12-in. cast-iron pipe, and contract was awarded to W. G. Fritz Co., West Orange, N. J., for $25,890. The second bid was $27,573, the average $43,352, the highest $63,459. Consulting engineer is C. C. Hopkins, 349 Cutler Bldg., Rochester. Contract unit prices are given below.

600 cu.yd. rock excav.	$5.00
200 cu.yd. earth excav.	2.00
Cast Iron Pipe, Laid:	
36 ft. 6-in. for blowoffs	.53
388 ft. 8-in. on reservoir bypass	.57
1,840 ft. 8-in. on Gray Spring line	.42
1,207 ft. 8-in. on main line	.40
100 ft. 10-in. on intake drain	.90
10,056 ft. 10-in. on main line	.42
17,330 ft. 12-in. on main line, lower sect.	.44
11,000 ft. 12-in. on main line, upper sect.	.58
16,100 lb. ball-and-spigot castings, ton set	20.00
4,000 lb. flanged castings, ton set	20.00
19 valve manholes	90.00
Setting Gate Valves:	
Five 6-in.	2.00
One 8-in.	3.00
Three 10-in.	4.00
Five 12-in.	5.00
Seven cir. valves	10.00
Two c.-i. valve boxes	1.00

Steel Pipe for Cleveland

THE city of Cleveland, Ohio, received bids June 26, 1931, on four types of steel pipe of 48-in. and 54-in. diameters and on 24-in. cast-iron pipe. Quantities were: 8,700 ft. 48-in., 7,800 ft. 54-in., and 4,100 ft. 24-in. Types of pipe on which bids were received were lock-bar, hammer welded, electrically welded and riveted steel.

On the lock-bar type seven bids were received ranging from $398,500 to $555,615; on hammer welded, two bids of $590,625 and $596,625; on electrically welded, seventeen bids from $332,050 to $548,025; on riveted steel pipe three bids, respectively $493,495, $504,770 and $563,625. The two lowest bidders both specified lock-bar. Unit prices are given in the accompanying tabulation of the lowest three bidders on each type.

Twelve bids were received at the same time on 49-in. and 55-in. electrically welded steel pipe. Curro & Whittaker Co. was low at $355,540, Stevens Construction Co. second at $403,220, and Great Lakes Construction Co. third at $421,420. High bid was $504,850.

Twelve bids were also received covering the use of Victaulic couplings. Two companies submitted identical low bids of $33,000, the unit being $2 per linear foot for both 48-in. and 54-in. steel pipe. The second low was $33,945, the units being $1.75 for 48-in. and $2 for 54-in.

	8,700 Ft. 48-In.	7,800 Ft. 54-In.	Total
I—Lock-Bar:			
Curro & Whittaker, South Euclid, Ohio	$20.00	$23.00	$398,500
Great Lakes Constr., Cleveland	21.80	32.00	484,975
Lowenson Const., Cleveland	23.65	32.00	496,355
These three companies bid for 4,100 ft. 24-in. cast-iron pipe respectively $11; $11.15; $12.60. This item is included in all total bids.			
II—Hammer Welded:			
Carroccio-Gaudio, Cleveland	$31.00	$36.00	$596,625
Cogito Constr. Co., Cleveland	26.75	38.00	590,625
III—Electrically Welded:			
Curro & Whittaker	$15.50	$19.50	$332,950
Great Lakes Constr.	16.35	25.40	386,080
Walter P. Gibbons Contg. Co., Cleveland	19.50	26.00	414,475
IV—Riveted Steel	50-In.	56-In.	
Great Lakes Constr.	$22.10	$32.75	$493,435
Lowensohn Constr. Co.	23.90	32.80	504,770
Carroccio-Gaudio	29.00	34.00	563,625
V—Electrically Welded:	49-In.	55-In.	
Curro & Whittaker Co.	$16.90	$20.95	$355,540
Stevens Constr. Co., Cleveland	18.88	25.38	403,220
Walter P. Gibbons Contg. Co.	20.00	26.00	418,825

Self-Priming Pump

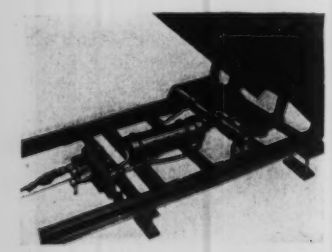
(Continued from page 195)

damage. As the main stream of water passes down through the bottom of the casing after having passed through the impeller, the pump is self-cleaning, for solids that might drop to the bottom are swept out with the discharge. In addition, a cleanout plug is provided at the bottom of the casing and the impeller is made readily accessible by merely removing the outer head. Pumps are available mounted on skids or on heavy welded steel four-wheel trucks.

Portable contractors pump

Hoist for Light Trucks

Production of a new heavy-duty hydraulic hoist for use with a complete line of steel bodies on Ford or Chevrolet trucks is announced by the Perfection Steel Body Co., Galion, Ohio. The hoist mechanism is of unusually sturdy construction, with an automatic hydraulic cushion which makes it possible to drop the body, either full or empty, very rapidly to the riding position without undue impact on the frame. This cushion becomes effective during the last few inches of body travel. The hoist can raise a load to a full 50 deg. dumping angle in less than four seconds, and return it by controlled gravity to any intermediate position. An automatic valve mechanism holds the body in any raised position in case the power fails, the engine stops or even if the power clutch should be released accidentally. For spreading, the loaded body will ride in any raised position on this hydraulic cushion. Similar units will soon be announced for trucks of larger capacity.



Hydraulic hoist mechanism

Business Notes

NYE ODORLESS INCINERATOR CORPORATION has announced that there is no connection between the Nye Odorless Incinerator Corporation and the Decarie Incinerator Corporation. This statement is made in connection with an announcement by the Decarie Incinerator Corporation, published in our issue of July 16, p. 120, that certain former officers and employees of the Nye Odorless Incinerator Corporation had joined with the Decarie Incinerator Corporation in the formation of the D-N Corporation to supply practically all types of incinerator plants and equipment.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has acquired the principal assets of the American Brown Boveri Co., Inc., and the capital stock of the Condit Electrical Mfg. Corp. After completing the manufacture of goods now on order at the Camden, N. J., plant of American Brown Boveri the operations of this company will be segregated. Large apparatus departments, with substantially the same personnel, will be transferred to the Allis-Chalmers plants at Milwaukee, while the remainder will be moved to the Boston, Mass., plant of the Condit Electrical Mfg. Corp. The corporate entity, organization, plant and products of the Condit company will be retained as at present.

RANSOME CONCRETE MACHINERY CO., Dunellen, N. J., has acquired a controlling interest in Transit Mixers, Inc., and will hereafter manufacture Transit mixers in its plant at Dunellen, N. J. The two companies will operate as separate units; there is no connection, by license or otherwise, between the Ransome company and any other concern in the truck mixer field.

PULSOMETER STEAM PUMP CO. has consolidated general and plant offices at 485 South 21st St., Irvington, N. J. E. M. Socec has been appointed manager and sales engineer.

REVERE COPPER & BRASS, INC., announces the appointment of J. A. Doucett as vice-president and general sales manager, with headquarters in New York City, and of Vincent W. Allen as manufacturing manager, with headquarters at the general offices of the company in Rome, N. Y.

INTERNATIONAL NICKEL COMPANY OF CANADA, LTD., has announced the following promotions: J. C. Nicholls from general manager to assistant to the president; Donald MacAskill from manager, mining and smelting division, to general manager; John F. Thompson from assistant to the president to vice-president.

MANGANESE STEEL FORGE CO., Philadelphia, Pa., has appointed the following representatives: J. G. Logan, Knoxville, Tenn., for Tennessee, North and South Carolina and Georgia; S. L. Morrow Engineering Co., Birmingham, Ala., for Alabama, northern Mississippi and western Florida; C. T. Patterson Co., Inc., New Orleans, La., for Louisiana and southern Mississippi; C. H. Collier, Dallas, Tex., for the State of Texas.

UNION CHAIN & MFG. CO., Sandusky, Ohio, has placed E. O. Williams in charge of its office in Philadelphia, Pa. Mr. Williams was formerly manager of the Howe Chain Co.

R. M. GATTSHALL, advertising manager of the Republic Rubber Co., Youngstown, Ohio, has been granted a leave of absence for one year to become executive manager of the joint merchandising committee of the Triple Supply and Machinery Associations.

BENEDICT STONE PRODUCTS CO., 122 South Michigan Ave., Chicago, Ill., has been formed and has taken over the assets of Benedict Stone, Inc. Officers of the new concern, which is closely affiliated with the Massey Concrete Products Corp., include: J. S. Hobson, president; G. H. Redding, vice-president and general manager; J. W. Lowell, vice-president; B. F. Landers, secretary and treasurer.

BALDWIN LOCOMOTIVE WORKS, INC., Philadelphia, Pa., has purchased subsidiary companies of Cramp-Morris Industrials, Inc., including I. P. Morris & De La Vergne, Inc.; De La Vergne Engine Co.; Pelton Water Wheel Co.; Cramp Brass & Iron Foundries Co.; and Federal Steel Foundry Co. Of these, the first three have become subsidiaries of the Baldwin-Southwark Corp., one of the principal units of the Baldwin Locomotive Works. Pelton Water Wheel Co. will continue to function as an independent unit, with headquarters at San Francisco, Calif. Cramp Brass & Iron Foundries Co. has become a subsidiary of the Baldwin Locomotive Works, while the assets and business of the Federal Steel Foundry Co. have been acquired by the Standard Steel Works Co., of Burnham, Pa., another Baldwin subsidiary.

New Publications

Slings—Selection of the proper type of sling chains for various uses is facilitated by an illustrated leaflet prepared by the NEWHALL CHAIN FORGE & IRON CO., 9 Park Place, New York City. Numbered illustrations show many types of completed slings, as well as end rings, links, hooks, connecting links and other parts.

Floodlighting—A new line of projectors designed to meet common and special floodlighting problems with the smallest number of reflectors and cover glasses is described in a recent bulletin of the BENJAMIN ELECTRIC MFG. CO., Des Plaines, Ill.

Building Water Supplies—"Water Supply for the Modern Skyscraper" is the title of a 24-p. illustrated Bulletin 103 of the CHICAGO PUMP CO., 2336 Wolfram St., Chicago, Ill., which shows, in diagrammatic form, a number of systems used for the supply of water to the various floors of multi-story buildings. Pumps and control equipment used in such installations are also described.

Screens—A new folder describing the straightline bar screen is now being distributed by the LINK-BELT CO., 910 South Michigan Ave., Chicago, Ill.

Conveyor and Elevator Belts—Practical suggestions for the design and maintenance of conveyor and elevator belts are given in great detail in a 40-p. illustrated book, "Belt Practice," published by the DIAMOND RUBBER CO., INC., Akron, Ohio.

Valves and Hydrants—MICHIGAN VALVE & FOUNDRY CO., 3631 Parkinson Ave., Detroit, Mich., has published a 48-p. catalog on filter valves and a 4-p. folder describing a new hydrant.

Pumps and Lighting Plants—HOMELITE CORP., 90 Riverdale Ave., Port Chester, N. Y., has issued two folders describing portable electric light and power plants and portable self-priming centrifugal pumps.

Blowers and Compressors—Large turbo-blowers and turbo-compressors for discharge pressures of up to 110 lb. with capacities of from 3,000 to 100,000 cu.ft. are described in bulletin 3132, issued by the INGERSOLL-RAND CO., 11 Broadway, New York City.

Drainage Gates—CALIFORNIA CORRUGATED CULVERT CO., West Berkeley, Calif., has issued a 40-p. supplementary catalog containing drawings, engineering data, installation photographs and other information relating to the use of Calco automatic drainage gates for the solution of drainage and flood control problems.

Car Spotters—Dimensions and specifications of car-spotting equipment are given in a 12-p. book 1292 issued by H. W. CALDWELL & SON CO., 2410 West Eighteenth St., Chicago, Ill. The book also gives a chart and method of figuring the degree of curvature of railroad tracks and the actual pull on car spotter rope.

Water Treatment—Removal of tastes and odors from water through the use of Nuchar activated carbon is discussed in an 8-p. pamphlet prepared by the INDUSTRIAL CHEMICAL SALES CO., INC., 230 Park Ave., New York City. This company has also reprinted an article, "Activated Carbon Removes Tastes and Odors From Water," by C. E. Trowbridge, describing water treatment at the Hays Mine station of the South Pittsburgh Water Co.

Iron Pipe—Advantages of Toncan copper molybdenum iron as a pipe material are discussed in a 64-p. illustrated booklet, "Toncan Iron Pipe for Permanence," issued by the REPUBLIC STEEL CO., Youngstown, Ohio. Information is presented on physical characteristics, processes of manufacture and applications in many branches of industry.

Concrete Placement — The use of high-frequency vibration in the placement of concrete is treated at length in an 18-p. illustrated booklet, "The Biggest Step Forward Ever Made in Concrete," published by the ELECTRIC TAMPER & EQUIPMENT CO., 400 West Madison St., Chicago, Ill. Different types of construction work are given individual treatment, the subjects including columns, flat slabs, deep beam sections, thin wall sections, tunnels, pipe line incasement and concrete products.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterworks			
San Francisco	Pipe lines	$1,550,000	Proposed
Bridge			
New Orleans	Bridge	16,000,000	Bids asked
Airports			
New Orleans	Airport (1st unit)	1,500,000	Proposed
Sports and Parks			
Jersey City	Stadium	2,500,000	Proposed
Trenton (N. J.)	Motor speedway	2,600,000	Proposed
Federal Government			
Oregon	Canal, tunnels, etc.	1,500,000	Proposed
Unclassified			
Texas	Oil pipe line	2,000,000	Proposed
Factories and Mills			
Salida (Colo.)	Mill	1,000,000	Proposed
Three Rivers (Que.)	Factory	1,500,000	Proposed
Power Plant			
Hot Springs (Ark.)	Hydro electric plant	10,000,000	Proposed
Buildings			
Brooklyn	Apartment	1,000,000	Separate contracts
Long Branch (N. J.)	Hospital	1,000,000	Proposed
Indianapolis	Library, etc	1,000,000	Proposed
Chicago	World Fair group	2,000,000	Contract

WATERWORKS

PROPOSED WORK

Calif., San Francisco—Bd. P. Wks., City Hall, preliminary plans 2 alternative emergency pipe lines to bring Hetch Hetchy water from Tesla Portal end of San Joaquin Valley pipe line to connection with viaducts leading into Spring Valley Lakes: Thomas Shaft Plan—25.9 mi. length, 30 m.g. capacity $1,559,000 or 45 m.g. capacity $1,970,000: Alamont Pass Plan—39.8 mi. length, 30, m.g. capacity $1,789,000, 45 m.g. capacity $2,059,000, 60 m.g. capacity $2,382,000. M. M. O'Shaughnessy, city engr.

BIDS ASKED

Ind., Amboy—Aug. 31, by City Council, W. F. Morgan, atty., constructing waterworks. $15,000.

Md., Baltimore—Aug. 5, by Bd. Awards, excavation, installing and backfill 48-in. suction main, for Ashburton Pumping Station. E. G. Rost, Municipal Bldg., water engr.

Mass., Boston—City taking bids steel standpipe, 75 ft. high, 37 ft. diam., for high pressure waterworks.

N. J., Paterson—Aug. 10, by Passaic Valley Water Comn., 156 Ellison St., furnishing and installing Great Notch pumping equipment. Fuller & Everett, 25 West 43rd St., New York, engrs.; adv. E.N.-R. July 30.

O., Columbus—Aug. 5 by Comrs. Franklin Co., F. L. Dopnally, clk., 7,895 ft. 4, 6 and 8 in. c.i. water mains, gate valves, hydrants, etc., Mifflin Sewer Dist. No. 1. $12,000. E. T. Bradbury, Court House Annex, engr.

Tex., Canyon—Aug. 3, by City, c/o H. Cash, waterworks system. $18,000 bond election soon for same.

Tex., Dallas—Aug. 1, by Preston Road Fresh Water Dist., I. P. De Loache, chn. Bd. Supervs., c/o Koch & Fowler, engrs., 801 Central Bank Bldg., constructing waterworks system, incl. 87,400 lin.ft. 8- and 12-in. c.i. mains, 1 pump house, two 250 g.p.m. horizontal centrifugal pumps, 15 tons c.i. specials, two 12-in. and thirty-eight 8-in. H.E. double gate valves, one 6-in. master meter, one 50,000 ga. steel tank and tower. $175,000. Noted Jan. 29.

W. Va., Grantsville—Aug. 11, by Town Recorder (A) small filter plant, incl. furnishing erecting steel tanks for filters, clearwell and sedimentation basin (B) necessary filter piping, equipment and erecting same, (C) low and high lift pumps, (D) tank founds., wooden frame building, incl. electrical wiring, in connection with construction. J. P. Blundon, Law Bldg., Keyser, consult. engr.

Ont., Ottawa—Aug. 4, by Bd. Control, Transportation Bldg., Contr. 5, alterations and additions to water purification pumping station Lemieux Island; Aug. 11, Contr. 6, furnishing and delivering c.i. pipe and special castings; Contr. 7, furnishing and delivering gate valves, check valves and sluice gates; Contr. 8, furnishing and delivering automatic valves; Contr. 9, furnishing and delivering venturi meters and water level controller; Contr. 10, furnishing, delivering and installing pneumatic conveying equipment; Contr. 11, furnishing, delivering and installing alum and lime dry feed machines and equipment; Contr. 12, furnishing, delivering and installing chlorine feed equipment, all in connection with Lemieux Island filtration plant. Total est. $1,300,000. W. E. MacDonald, City Hall, and Gore, Nasmith & Storrie, Confederation Life Bldg., Toronto, engrs.

CONTRACTS AWARDED

Calif., Alhambra—City Council, constructing 700,000 gal. circular concrete ring-extension type reservoir on Dupuy Hill, to Mittry Bros. Constr. Co., Detwiler Bldg., Los Angeles, $10,675. Noted June 26.

Calif., Santa Barbara—For 16 in. cement lined steel pipe line, to F. B. Gridley, 256 South Lake St., Pasadena, $23,764.

Ill., Quincy — City Council, W. R. Gelston, supt., water softening plant complete, incl. rein.-con. basins, brick superstructure complete, Dorr Company, 85 ft. clarifier circular for depth 16 ft., lime conveyor and 2 lime bins, 2 car load capacity, 2 Omega lime feed machines, 2 Omega lime scalkers, 2 agitators, one 15 hp. Scotch Marine type boiler, Gardner-Denver motor driven air compressor, scrubber, dryer, wrought iron pipe for distributing carbon dioxide, 2 sluice gates, to Buerkin & Buerkin Co., Quincy, $58,-112. Noted Apr. 9.

Ill., Western Springs—Village, general contract iron removal and water softening plant, Contrs. A and B, to Burnip Constr. Co., 568 East Broad St., Columbus, O.; clarifier equipment, to Dorr Co., 333 North Michigan Ave., Chicago; pumps, to Worthington Pump & Mchy. Co., 37 West Van Buren St., Chicago. Est. $80,000. Noted Feb. 19.

Ia., Altoona—City Council, 17,970 ft. 2- to 6-in. c.i. mains, 6,650 lb. special cast iron, 20 fire hydrants, 19 gate valves and boxes, 40,000 gal. tank on 100 ft. tower with concrete founds., pump house, 50 g.p.m. deep well pump, to Pittsburgh-Des Moines Steel Co., Tuttle and Southwest 10th Sts., Des Moines, $18,786. Noted May 7.

Kan., Collyer—City, distribution lines, pumphouse founds., to W. B. Carter, 7 North Rockford St., Tulsa, Okla.; tank, tower, pumps, to U. S. Wind Engine & Pump Co., 1100 Hickory St., Kansas City, Mo. Est. $24,500.

Mass., Boston—Metropolitan Dist. Water Supply System Comn., 20 Somerset St., control works at Main Dam of Swift River Reservoir, incl. excavating, lining, 1,100 ft. rock tunnel, 30 ft. diam., shaft, excavating approach, etc., to Northern States Constr. Co., 221 Elmore Ave., Elizabeth, N. J., $561,223. Noted July 9.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenues H and J, to C. Howard Mead, $9,050. Noted July 7.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenue X, to J. Deliso, Ozone Park, $11,964. Noted July 2.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply Gas & Electricity, Municipal Bldg., New York, mains in 28th St., to L. DiGregory, $8,684. Noted July 2.

O., Columbus—City, W. H. Duffy, dir. Service, erecting 2 m.g.e. elevated steel water tank and foundation, Joyce St. and 5th Ave., to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $78,900: foundation incl. 1,200 cu.yd. excavation, 550 cu.yd. concrete, 3,500 lb. reinforcing steel, 25,000 lb. structural steel, to J. F. Coady, Columbus, $5,602.

Okla., Chickasha—City Council, new filtration plant, to Standard Paving Co., 2119 East 11th St., Tulsa, $80,214. est. $90,000.

Pa., Canonsburg—D. C. Morrow, mgr. Citizens Water Co., Washington, impounding dam, earth dam and concrete spillway, 200 m.g. capacity, to D. Thompson, 380 Shirls Ave., Washington. Est. $100,000. Noted Apr. 30.

Pa., Pittsburgh—See "Streets and Roads."

Pa., Waynesburg—Waynesburg Water Co., H. T. McLelland, local mgr., impounding earth dam with concrete spillway, 80 m.g. capacity, to Tri State Eng. Co., Waynesburg. Noted June 26.

R. I., Providence—City Clerk, City Hall, 1 story brick booster pumping station, Reservoir Ave., to Central Eng. & Constr. Co., 210 Main St., Pawtucket. Est. $15,000 or more. Noted July 2.

Va., Waynesboro—City Council, reservoir at Coiners Spring, to Haley, Chislom & Morris, Charlottesville, $34,139; 14,000 ft. pipe line from reservoir to city, to McLelland & Co., Charlotte, N. C., $7,087.

Wash., Seattle—City, Bd. P. Wks., pipe line on East 65th St., to Argentieri & Colorossi, 5214 35th St. S.W., $39,007.

Washington—Ulen Engineering Corp., Lebanon, Ind., and 120 Bway., New York, general contractors, furnishing and installing 14 mi. 16 in. wire-wound wood pipe for Mountain Lakes Water Supply Line from Lake Marion to the inter-city reservoir at 16th St. N.E., to Federal Pipe & Tank Co., 5332 24th St. N.W., Seattle, for Mountain Lakes Water Co., 10107 Woodland Park, Seattle. Noted July 16 under "Contracts Awarded."

Ont., Guelph — Drilling well to supply 1 m.g.p.d., to Jordan-Roberts Sales Ltd., Morrell St., Brantford, $16,800. Est. $16,000.

Ont., St. Thomas—W. C. Miller, city engr., structural steel in connection with construction filtration plant, to London Structural Steel Co. Ltd., Burslem Ave., London; tile to Italian Mosaic & Marble Co., 79 Maitland St., Toronto. Total est. $90,000. Noted Apr. 30.

Ont., Tilbury—Waterworks and purification system, intake pipe force main crib pumphouse to Chatham Dredging Contg. Co., 96 King St., Chatham, $20,000; mains to National Iron Co., Cherry St., Toronto, $15,000; chlorinator to Chemical Feeder Water Equipment, Ltd., 114 Jarvis St., Toronto, $11,000; pumps to Turbine Equipment Ltd., 73 King St., W. Toronto, $9,000; elevated tank to Horton Steel Works, Bridgeburg.

See proposal advertising on page 61

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LEADITE

Trade Mark Registered U.S. Pat. Office

—and in Filter Plant Pipe Galleries . . . many miles of bell and spigot pipe *are efficiently jointed with* LEADITE

Pipe lines in Filter Galleries (where space is usually at a premium) must be Tight and Dependable. Years of experience have conclusively proven that bell and spigot lines jointed with LEADITE "ARE" DEPENDABLE IN EVERY RESPECT.

Thousands of miles of bell and spigot water lines throughout the civilized world are satisfactorily jointed with LEADITE.

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Tested and used for over 30 years.
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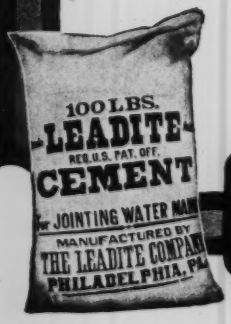

THE LEADITE COMPANY
Land Title Building **Philadelphia, Pa.**

No Caulking

SEWERS

PROPOSED WORK

Ill., Harrisburg—Plans sewerage system, cin. sewage disposal plant, additional sewers. $300,000-$400,000. Russell & Axon, 6200 Easton Ave., St. Louis, and McDaniel Bldg., Springfield, Mo., engrs. Noted.

Minn., Duluth—Alvord, Burdick & Howson, engrs., 8 South Dearborn St., Chicago, Ill., making report sewage disposal plant and intercepting sewers, for City.

N. H., Claremont—Town, C. A. Rice, sewer comm., plans sewerage system. $500,000. Engineer not appointed.

O., Canton — Stark Co. Reedurban Dist. Sanitary Sewer, one plan outlined is to lay sewer line to Massillon Disposal Plant, $225,000, another plan, erecting disposal plant in vicinity Sippo Lake $175,000, or connecting lateral mains in district with Canton lines and erecting pumping station to force flow. $150,000. G. M. Davidson, Canton, co. sanitary engr.

BIDS ASKED

Calif., Burbank—Aug. 4, by F. S. Webster, city clk., 9,729 ft. 8 in., 460 ft. 6 in., vitr. sewers with cement joints, and 1,450 ft. 8 in. vitr. sewer with compound joints, also wyes, manholes in Riverside Dr., between Olive Ave. and Catalina St., et al.

Ind., Ft. Wayne—Aug. 11, by Bd. P. Wks., City Hall, S. S. Snyder, secy., St. Marys River Sewer, incl. 14 and 18 in. sewer pipe. $57,000.

Ia., Sibley—Aug. 7, by City Clerk, sewage disposal plant, alternate bids on Imhoff tank, separate sludge digestion with rock filters, lifts. $25,000-$30,000. W. E. Buell & Co., 503 Insurance Exchange Bldg., 7th and Pierce Sts., Sioux City, engrs. Noted Apr. 9.

Ky., Louisville—Aug. 6, by Commissioners of Sewerage, 400 Marion E Taylor Bldg., Beale Branch Trunk Sewer, Sect. B, 3,620 ft. rein.-con. semi-eliptical shaped sewer, of 3 sizes varying from maximum size of 10 ft. 3 in. to 9 ft. W. M. Kaye, 400 Marion E. Taylor Bldg., technical engr.

Mich., Newberry—See "Contracts Awarded."

Mo., St. Louis—Aug. 11, by Bd. P. Serv., City Hall, 2,995 ft. 8- to 21-in. vitr. clay sewer in Rock Creek Sewer Dist. 19 and Public Outlet, $8,520; 680 ft. 12 and 15 in. in Warne Ave. Sewer 2, $1,900; 2,705 ft. 8- to 18-in. in Baden Sewer 8, $7,640; 2,535 ft. 8- to 18-in. Baden Sewer 9, $6,200; grading, vibrated concrete aprons, taxi strips and service road at St. Louis Municipal Airport, Bridgeton, $20,000. W. W. Horner, city engr.

N. Y., Brooklyn—Aug. 5, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Bedford Ave., between Avenues Y and Z.

N. Y., Poughkeepsie—Aug. 5, by Dpt. Mental Hygiene, State Office Bldg., Albany, sewage disposal system, at Hudson River State Hospital.

N. C., Roxboro—Aug. 7, by Mayor and Bd. Comrs., 2,500 ft. 18- and 24-in. outfall sewer. Spoon & Lewis, 432 Jefferson Bldg., engrs.

O., Columbus—Aug. 5 by Comrs. Franklin Co., F. L. Donnally, clk., 3,432 ft. 30 and 42 in. rein.-con. pipe, 108 ft. 30 in. c.i. pipe and 1,000 ft. 6 in. vitr. pipe sewers in Truro No. 1 Sewer Dist., $30,000; 14,098 ft. 8, 12, 15, 18, 21, and 24 in. vitr. clay sewers, 3,400 ft. 6 in. subdrain; 3,300 ft. 4 in. subdrain and 660 ft. 6 in. vitr. riser pipe, etc., Truro No. 2 Sewer Dist., $40,000. E. G. Bradbury, Court House Annex, engr.

S. D., Miller — Aug. 17, by City Council, sewage disposal plant. $25,000. W. E. Buell & Co., 503 Insurance Exchange Bldg., Sioux City, Ia., engrs.

S. D., Sibley—Aug. 17, by City Council sewage disposal plant. $25,000. W. E. Buell & Co., 503 Insurance Exchange Bldg., Sioux City, Ia., engrs.

W. Va., Parkersburg—City Council takes bids about Aug. 18, sanitary sewerage system in annexed territory, incl. 72,000 cu.yd. excav., 32,000 lin.ft. 6 in., 35,000 lin.ft. 8 in., 4,600 lin.ft. 10 in., 2,000 lin.ft. 12 in. and 1,350 lin.ft. 15 in. vitr. sewer pipe, 171 manholes, 4 flush tanks, replacing 3,000 sq.yd. paving. L. G. Merrill, city engr.

Wis., Milwaukee—See "Excavation, Drainage, Irrigation, Levees, River and Harbors."

CONTRACTS AWARDED

Ark., Dumas—Sewer improvements, filtering bed, super tanks, etc., to Baker Constr. Co., Perrine Bldg., Oklahoma City, Okla., $44,267. Noted June 18.

Calif., Los Angeles—See "Streets and Roads."

Calif., Monrovia—See "Streets and Roads."

Ia., Creston—City Council, City Hall, 1 mi. 30 in. main sewer, to W. B. Carter and Dobson & Humphreys, 510 Securities Bldg., Omaha, Neb., $18,500; South Side Intercepting Sewer and Pumping Station, to E. L. Royer Constr. Co., Valley Junction, $9,240; sewage disposal plant, to Currie Constr. Co., Waterloo, $80,105. Grand total $107,845. Noted July 2.

Kan., McPherson—City Council, sewage disposal plant, main sewers, driveways, etc., to W. B. Carter, 7 North Rockford St., Tulsa, Okla., $63,925. Noted June 25.

Ky., Louisville—Commissioners of Sewerage, 400 Marion E. Taylor Bldg., Garden Drive Sewer, Contr. 55, 2,673 lin.ft. 27, 33, 36 or 42 in. circular rein.-con. of plain concrete pipe, 851 lin.ft. 15 and 18 in. circular vitr. pipe, 3,524 lin.ft. open trench work, 1,650 cu.yd. rock excav., 3,500 lb. steel reinforcing bars, 456 sq.yd. vitr. brick invert lining, 3,460 sq.yd. macadam paving, to G. M. Eady Co., 340 Byrne St., $67,430. Noted July 9.

Md., Baltimore—Bd. Awards, sanitary sewers, storm drains in Storm Water Contr. 167, incl. 10,500 cu.yd. excavation, 5,809 lin.ft. 24- to 54-in. rein.-con., 1,665 lin.ft. 21 and 24 in. vitr. and 2,366 lin.ft. 15 and 18 in. vitr. drains, 17,300 lin.ft. 8 to 12 in. and 4,040 lin.ft. 5 in. vitr. sewer, to Marino Contg. Co., 305 North Exeter St., $48,428.

Mass., Boston—Metropolitan Dist. Comm., 20 Somerset St., constructing concrete Charles River Basin overflow from Boston Marginal Conduit near Fruid St., to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $30,291.

Mass., Norfolk—Commonwealth of Massachusetts, Dpt. Health, State House Boston, sewerage work at State Prison Colony, to Munroe & Westcott, Community Theatre Bldg., North Attleboro, $36,225. Noted June 25.

Mass., Springfield (br. Springfield) — Bd. Selectmen, constructing storm and sanitary sewers to Clemente Contg. Corp., Mt. Eden Ave., New York, $59,000 est. $50,000.

Mass., Westfield—Dpt. P. Health, State House, Boston, sewers, appurtenances, boiler tank and pumping station, at Westfield State Sanatorium, to L. D. Phillips Constr. Co., 10 Main St. Est. $25,000.

Mich., Dearborn—City, brick, monolithic concrete sewers, brick and concrete manholes, Interceptor Sewer Sect. 58, and Storm Sewer from Ford Airport to River Rouge, Sect. 56, to Blanck & Gargaro, 40 Seven Mile Rd. E., Detroit, $74,484 and $102,428 respectively. Noted June 25.

Mich., Newberry—Village, 1 mi. 30 in. concrete pipe sewer Tahquamenon River Rd., $25,000. Pipe to be manufactured and laid by Village forces under supervision of T. E. Anderson, Newberry, village engr.

N. H., Laconia—State, rebuilding old and constructing 1 new sand sewage filter beds, to Davidson & Swanberg, 75 Amherst St., Manchester.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., sewer in West 58th St., to J. V. Timoney Constr. Co., 256 Bway., $32,139; in Bway., to T. A. Reilly Co., 105 Court St., Brooklyn, $17,923. Noted July 2.

N. J., Fort Lee—Bd. Boro Council, Municipal Bldg., sanitary sewers in Anderson Ave., to P. Battaglia, 374 Jersey Ave., Fairview, $21,306; Lemoine Ave., to Bergen Contg. Co., Inc., 365 Lawton Ave., Grantwood, $37,420. Noted June 18.

O., Cleveland—City, sanitary intercepting sewer connection East 55th St. at Kingsbury Run, to Cogito Constr. Co., 12616 Corlett Ave., $196,981.

Okla., Nichols Hills (Oklahoma City P. O.)—City, 17,000 ft. sanitary sewer in Dist. 2 and outfall sewer, to E. W. Baker & Co., 224 Southwest 27th St., Oklahoma City, $25,226. Est. $28,000. Noted June 25.

Pa., Pittsburgh—See "Streets and Roads."

R. I., East Providence (br. Providence)—Town, sewerage work, to F. W. Christy, Chapman Bldg., Providence. Est. $25,000.

Wis., Milwaukee—To Milwaukee Sewer & Drainage Co., 2510 North Humbolt St., c.i. mains in West Dixon St., $3,131, West Dixon St. $2,818, South 71st St. $1,629; to A. W. Glawe, Inc., 20 State St., Wauwatosa, South 76th St. $2,197, South 69th St. $2,199; to Kehrein Bros., 2147 North 17th St., West Main St. $3,329; to S. H. Ribbens Bros., 5016 North Woodburn St., South 73rd St. $2,313. Grand total $17,263.

Wis., Milwaukee—Dpt. P. Wks., City Hall, sewers in East Albert St., to H. Hehensee, 2808 South 15th St., $353; North 3rd St., to Mierswa Constr. Co., 2838 West Cherry St., $14,627; North 31st St., to P. D. Johnson, 2661 North 35th St., $4,049; North 25th St., to G. R. Fehr, 2755 South 34th St., $21,817; North 54th St., to A. W. Glowe, 20 State St., Wauwatosa, $1,274; West Hopkins St., to Wisconsin Sewer & Drain Co., 2510 North Humboldt Ave., $259. Grand Total $44,688. Noted June 22.

Ont., Brampton—Town C. M. Corkett, clk., construction work in connection with sewage disposal system, to H. G. Heatly, Mill St., $28,725.

WASTE DISPOSAL

PROPOSED WORK

N. Y., New York—Dpt. Sanitation, Municipal Bldg., bids in fall, incinerator, Cromwell Ave. and 150th St. Noted July 9.

N. Y., New York—Dpt. Sanitation, Municipal Bldg., bids in fall, general contract incinerator, 215th St., from 9th to 10th Aves. $500,000. Noted July 9.

CONTRACTS AWARDED

N. Y., Castleton Corners—J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, general contract incinerator at Sea View Hospital, to Ballard Sprague Co., Inc., 25 East 26th St., New York, $16,969; plumbing, to R. W. Baylor, 9 Sommers Pl., Richmond Hill, $1,338. Noted July 2.

BRIDGES

PROPOSED WORK

Calif., Modesto—Bd. Comrs. Stanislaus Co., plans bridge over Dry Creek connecting with Waterford Rd. and Covena Ave. Est. exceeds $25,000.

Calif., Patterson — Stanislaus Co. (Modesto) bridge over San Joaquin River, near here. $150,000 or more.

Calif., Red Bluff — Tehama Co. bridge over Sacramento River to Bend. $47,000. W. F. Luning, Red Bluff, co. surv.

Calif., San Francisco—Bd. P. Wks., City Hall will take new bids Contracts 5, 7 and 9 Golden Gate Bridge, Contr. 5, construction Presidio Rd. Contr. 7, paving main approach spans; Contr. 9, Cable house and toll terminals. Former bids rejected. Noted July 23.

Calif., Santa Cruz—City and Santa Cruz Co., concrete bridge over Woods Lagoon. $29,000.

Ind., Muncie—Bd. Comrs. Delaware Co., for Wysor St. Bridge, 5 spans 321 ft. long, rein.-con., 2 sidewalks. $140,000. L. Janney, city engr.

N. J., Manasquan—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., concrete viaduct over Stockton Lake and Sea Girt Ave. $350,000. Project in abeyance. Noted Apr. 30.

N. J., South Plainfield—Bd. Freeholders Middlesex Co., Court House, New Brunswick, plans rein.-con., steel bridge. $25,000. W. F. Buchanan, 280 Hobart St., Perth Amboy, co. engr.

N. J., West Milford—Bd. Freeholders Passaic Co., Court House, Paterson, steel beam bridge across Ringwood Ave. $25,000. G. Ferguson, Paterson, co. engr.

Oklahoma — State Hy. Dpt., Oklahoma City, preliminary plans 8 span 132 ft. rein.-con. bridge at Alva, Woods Co. $30,000; 9 span 144 ft. rein.-con. trestle bridge at Gage, Ellis Co. $35,000. A. R. Losh, hy. engr.

Okla., Tulsa—City, 7 span, 510 ft. rein.-con. bridge, 3rd St., $100,000; 6 span, 440 ft., rein.-con. trestle, Quarch St., $80,000. H. A. Parker, city engr.

Texas—State Hy. Comm., W. R. Ely, chn., Austin (**F.A.P. means Federal Aid Project**), completed plans and soon takes bids 766 ft. long, two 150 ft. and one 200 ft. steel truss spans, I-beam concrete and steel bridge, and approaches over Colorado River, Hy. 3, Colorado Co., $150,000, R. E. Schiller, Columbus, resident engr.—7 steel I-beam bridges, concrete flooring, approaches, Hy. 43, Robertson Co., $45,000 C. B. Thames, Hearne, resident engr.—steel I-beam bridges, concrete flooring, timber pile trestle over Tantabogue Creek and 2 reliefs on Hy. 19, F.A.P. 225, reopened, Trinity Co., $45,000, D. K. Caldwell, Crockett, resident engr.—several concrete girder bridges, Hy. 18, F.A.P. 530-B, Motley Co., $60,000, E. W. Mars, Matador, resident engr.—928 ft. steel and concrete bridge over San Marcos River, Hy. 3A, Caldwell Co., B. R. Schmidt, Luling, resident engr.—3,007 ft. concrete and timber pile trestle bridge over Carancahua Bay and 4 Creeks, Hy. 57, Calhoun Co., P. D. Bushong, Port Lavaca, res. engr.—1,801 ft. steel, concrete and timber pile trestle bridges, steel I-beams, concrete flooring, over North and South forks of Place River, Hy. 4, Cottle Co., D. M. Puckett, Wichita Falls, division engr.—2,796 ft. steel and concrete bridge over Nueces River and Nueces River Relief, Hy. 12, F.A.P. 429-C, Alice and Sinton Counties, T. W. Bailey, Corpus Christi, division engr.

Texas—State Hy. Comm., W. R. Ely, chn., Austin, soon takes bids 150 ft., steel, concrete overpass over Chicago, Rock Island & Pacific Ry., Hy. 75, Wheeler, Wheeler Co. M. L. Grady, Shamrock, resident engr.

Texas—State Hy. Comm., W. R. Ely, chn., Austin, 143 ft., rein.-con. overpass on skew, over Galveston, Harrisburg and San Antonio R.R., Hy. 12, Federal Aid Project 518-D, Wharton Co., $50,000, J. G. Turner, Wharton, resident engr., 225 ft. steel, concrete overpass over same railroad tracks, Hy. 3, Federal Aid Project 484-C, Kinney Co. M. B. Hodges Uvalde, resident engr.

BIDS ASKED

California—Aug. 5, by C. H. Purcell, engr., State Hy. Comm., Sacramento, 102 ft. concrete barrel arch span bridge, two 46-ft. concrete girder approach spans having spandrel walls faced with stone over East Branch, South Fork, Eel River near Gerberville, Humboldt Co.—structural bridge, incl. two 70-ft. plate girder spans, two 50-ft. steel beam spans, three 30-ft. tower spans, two 142-ft. truss spans on steel towers and bents, with concrete piers and abutments, over Spanish Creek, near Keddie, Plumas Co.—rein.-con. bridge over Bixby Creek, 18 mi. south of Carmel, incl. 330-ft. open spandrel arch span and nine 40-ft. girder approach spans, Monterey Co.—5 rein.-con. bridges varying from 48 to 300 ft. in length, between Tipton and Tulare, Tulare Co.—rein.-con. bridge over Fern Canyon, 5 mi. northeast of La Canada, incl. 120 open spandrel arch and seven 134-ft. slab spans, Los Angeles Co.—bridge over north arm Newport Bay near Newport Beach, incl. 42-ft. stringer removal span and thirty-four 19-ft. timber spans with concrete deck on creosoted pile bents, Orange Co.—untreated crushed gravel or stone surfacing material stockpiled 9.3 mi. between Diddy Hill and Montgomery Creek, Shasta Co.—grading, concrete surfacing 7.6 mi. between Tipton Crossing and Tulare, Tulare Co.

Georgia—See "Streets and Roads."

Illinois—Aug. 25, by State Dpt. Purchases & Constr., Division of Waterways, State House, Springfield, Contr. B-1, bridge over Illinois Waterways, Van Buren St., Joliet—Div. B-3, bridge over Marseilles Canal near Marseilles, La Salle Co.—Contr. B-4, bridges over Illinois Waterways at Jackson and Jefferson Sts., Joliet—Contr. B-5, bridge at lower entrance Brandon Rd. lock, Will Co. L. D. Cornish, ch. engr.; adv. E.N.-R. July 30.

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Bridges (Continued)

Iowa—Aug. 4, by State Hy. Comn., Ames, 49 culverts, extensions, Road 99, B-720, Dubuque Co.—50 x 24 ft. I-beam bridge, 17-ft. slab bridge, three 36 x 24 ft. I-beam and one 36 x 24 ft. I-beam bridges, Shenandoah Rd., B-659, Fremont Co.—70 x 20 ft. pony truss bridge with two 32 x 20 ft. I-beam approaches, 30-ft. concrete arch, two 150 x 20 ft. high truss spans with seven 40 x 20 ft. I-beam approach spans, B-574, Keokuk Co.—60 x 20 ft. pony truss bridge, 80 x 20 ft. pony truss bridge, with two 32 x 20 ft. I-beam approaches, and 30-ft. arch, Roads 103 and 161, B-743, Lee Co.—80 x 24 ft. plate girder bridge, Road 32, B-758, Polk Co. —40 x 24 ft. I-beam bridge, Road 83, B-631, Pottawattamie Co.—28 x 24 ft. I-beam bridge, 70 x 20 ft. pony truss bridge, 15 culverts, extensions, Road 23, B-772, Van Buren Co. C. R. Jones, aud.

Louisiana — Aug. 25, by State Hy. Comn., Baton Rouge, bridge over Atchafalaya River from Morgan City to Barwick, Project 6004, St. Marys Parish, incl. 5,250 lin.ft. 6 in. c.i. soil pipe, 5,080 lin.ft. 12 in. precast pipe, 1,686,000 lb. reinforcing steel, 24,540 lin.ft. untreated timber poles, 4,453,000 lb. fabricated structural steel silicon, 4,727,000 lb. fabricated structural steel carbon — bridge on Livonia-Lebeau Hy., Pointe Coupee Parish, incl. 1,470,000 lb. fabricated structural steel silicon, 5,200,000 lb. fabricated structural steel carbon, 25,000 cu.yd. concrete, 1,184,294 lb. reinforcing steel, 16,620 lin.ft. creosoted timber piles — bridge on Golden Meadow-Grand Isle Hy., Project 3806, Lafourche Parish, incl. 5,200 lb. reinforcing steel, 196,000 lb. structural steel, 3,370 lin.ft. creosoted timber piles, 6,400 sq.yd. asphalt wearing surface—bridge on Golden Meadow-Grand Isle Hy., Project 3607, Jefferson Parish, 13,700 lb. structural steel, 29,100 lin.ft. creosoted structural timber, 8,100 sq.yd. asphalt wearing surface, or 76,600 M.F.B.M. asphalt black gum wearing surface — overpass on Baton Rouge-New Orleans Hy., Project 3602, Jefferson Parish, 355,000 lb. reinforcing steel, 1,500 cu.yd. concrete, 35,000 lb. structural steel, 10,600 lin.ft. precast concrete piles—overpass on Jonesboro-Tannehill Hy., Project 3403, Jackson Parish, 7,357 sq.yd. concrete paving, 22,000 lb. reinforcing steel, 94,000 lb. structural steel, 2,650 lin.ft. creosoted timber piles. H. B. Henderlite, hy. engr.

La., New Orleans—Sept. 15, by State of Louisiana acting through State Advisory Board, c/o H. P. Long, chn., and City, acting through Public Belt R.R. Comn., c/o T. M. Walmsley, pres., at Council Chamber, City Hall, railroad and highway bridge over Mississippi River, near here; adv. E.N.-R. July 30. Noted May 21.

Maine—Aug. 5, by State Hy. Dpt., Augusta, Pelton Stream Bridge, Anson, involving 133 cu.yd. concrete—Randall Bridge, Island Falls, 661 cu.yd. concrete and 46,800 lb. structural steel—Six Mile Falls Bridge, Bangor, 175 cu.yd. concrete, 20,600 lb. structural steel—Canal Bridge, Milo, 475 cu.yd. concrete — Mill Creek Bridge, Portland, 503 cu.yd. concrete—Stroudwater Bridge, Portland, 310 cu.yd. concrete—Hanson Bridge, Presque Isle, 122 cu.yd. concrete—Torsey Pond Bridge, Readfield, 175 cu.yd. concrete—Redlonville Bridge, Rumford and Mexico, substructure and flooring, 140 cu.yd. concrete, 129,000 lb. structural steel—Union Bridge, Atkinson and Sebac, 1,446 cu.yd. concrete—Strip Bridge, Wallagrass Plantation, 260 cu.yd. concrete.

Maryland—Aug. 4, by State Roads Comn., Baltimore, G. C. Uhl, chn., single 8 ft. span concrete slab bridge, adjacent to existing bridge, Contr. Ch-99-511, Carroll Co.—altering and extending 3 bridges, Contr. M-170-311, Montgomery Co.—altering and timber flooring on existing bridge over Nanticoke River, Sharptown, Contr. Wi-61-17, Wicomico Co. L. H. Steuart, secy.; adv. E.N.-R. July 30.

Md., Baltimore—Aug. 12 by Bd. Awards, 2 bridges over Pennsylvania R.R. tracks, Warwick Ave. bridge from Franklin to Lexington Sts., 66 ft. wide 39 ft. 6 in. roadway and two 13 ft. sidewalks and Garrison Ave. bridge, between Fairmont and Edmondson Aves., 75 ft. wide, 45 ft. roadway, two 15 ft. sidewalks. N. L. Smith, Municipal Bldg., hys. engr.

Mass., Great Barrington—Town, Bd. Selectmen, E. J. Kelly, Town Hall and State, taking bids, concrete, steel bridge over Housatonic River, $75,000. Noted Apr. 16 under "Contracts Awarded."

Mo., St. Louis—Aug. 18, by City, Bd. P. Serv., City Hall, erecting 7,000 tons structural steel for East St. Louis Union Station approach to St. Louis Municipal Bridge across the Mississippi River, between St. Louis, Mo. and East St. Louis, Ill. $175,000. C. E. Smith & Co., 1752 Railway Exch. Bldg., engrs. Noted Mar. 19.

N. J., Paterson—Aug. 4, by Bd. Freeholders Passaic Co., Court House, steel beam bridge across Ringwood Ave., Ringwood. $25,000. G. Ferguson, co. engr.

O., Lisbon—Columbiana Co., takes bids about Sept. 20, 59 ft. steel and concrete girder bridge, 39 ft. roadway, two 3 ft. sidewalks. Elkton Rd., $25,000. L. C. Lisbon, engr.

Pennsylvania—See "Streets and Roads."

Tenn., Memphis—City Council, W. Overton, mayor, bids about Aug. 10, 2,400 ft. concrete, steel viaduct on Sumner Ave., 36 ft. roadway, 7½ ft. sidewalks. $350,000. City and State Dpt. Hys. & P. Wks., Nashville, R. H. Baker, comr., will each pay 1/5 of cost, Union Ry. Co., Union Station, R. K. Williams, engr.,

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and Louisville & Nashville R.R. Co., Louisville, Ky., W. H. Courtenay, ch. engr., will pay balance of cost. W. F. Shultz, Shrine Bldg., engr. Noted Feb. 5.

Virginia—Aug. 11, by State Hy. Dpt., Richmond, Piney River Bridge, 1 span, 127 ft., incl. 42,300 reinforcing steel, near Lowesville, Route 313, Project S-636-B, Amherst Co.—Brick Kiln Bridge, 1 span, 32 ft., incl. 8,985 lb. reinforcing, 6 mi. from Caskie, Route 13, Project F-658-B3, Appomattox Co.—Stevens Run Bridge, incl. 43,160 lb. reinforcing steel, 4.5 mi. from Caskie, Route 13, Project F-658-B4, Buckingham Co. H. B. Henderlite, hy. engr.

CONTRACTS AWARDED

Ark., Little Rock—West 12th St. Impvt. Dist., c/o Bd. Comrs., 4 concrete steel bridges, to C. L. Garms, 1306 West 27th St., $15,641.

California — C. H. Purcell, engr. State Hy. Comn., Sacramento, rein.-con. girder bridge to have six 34 ft. spans on concrete pile bents, abutments with wing walls over Coyote Creek, at San Jose, Santa Clara Co., to A. J. Raisch, San Jose, $31,271. Noted June 19.

Calif., Redding—C. H. Purcell, engr. State Hy. Comn., Sacramento, timber bridge over Seamens Gulch 23 mi. east of here, Shasta Co., to R. Bean, Clipper Mills, $15,358. Noted June 26.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, 1,250 ft. steel superstructure, Route 49, Sect. 146-C-2, Cook Co., to Milwaukee Bridge Co., 1410 34th St., Wilwaukee, Wis., $63,111—54 ft. span rein.-con. arch bridge, Route 5, Sect. 2-Y-B Cook Co., to Standberg Bros. Co., 608 South Dearborn St., Chicago, $37,930—40 ft. steel I-beam bridge extension, Tazewell Co., to Schmitt Constr. Co., Peoria, $2,888—55 ft. rein.-con. girder bridge, McHenry Co., to A. P. Munsen, Marion, Ia. $13,191—150 ft. steel bridge with 6 I-beam approach spans on concrete piles, Johnson and Pulaski Counties, to Clinton Bridge Wks., Clinton, Ia., substructure $25,172 and superstructure $10,439—five 75 ft. spans, rein.-con. arch bridge, 24 ft. rein.-con. slab, one 16 ft. and two 8 ft. rein.-con. culverts, La Salle Co., to Widell Co., Mankato, Minn., $62,231. Grand total $214,962. Noted June 4.

Indiana — State Hy. Comn., Indianapolis, rein.-con. slab bridge over Davis Ditch, steel truss bridge over Rush Creek, Posey Co. and 2 steel truss bridges, one over Pigeon River, other over Fawn River, La Grange Co., to Vincennes Bridge Co., Vincennes, $18,265 and $21,644 respectively, est. $23,486 and $29,138 respectively —2 rein.-con. girder bridges, one over Antrim Ditch, other over Kinderman Ditch, Pulaski and Starke Counties, to Haines & Haines, Dowagiac, Mich., $11,292 est. $15,948—steel truss bridge over Wildcat Creek, Howard Co., to A. Hash, Sandborn, $20,620 est. $27,813—rein.-con. arch bridge over Big Walnut Creek, Putnam Co., to R. L. Schutt, 5818 East New York St., Indianapolis, $31,986 est. $43,661. Grand total $103,807. Noted July 2.

Iowa—State Hy. Comn., Ames, 2 multiple span I-beam bridges, Cherokee Co. to Wickham Bridge & Pipe Co., 1905 West Bway., Council Bluffs, $47,225—1 I-beam bridge, 2 culverts, Crawford Co., to Duvall & McKinney, Logan $4,334—1 high truss bridge with approaches, 1 three span I-beam bridge, Dallas Co., and 1 I-beam bridge, 18 culverts, extensions, Polk Co., to Snyder & Johnson, Humboldt, $41,200 and $17,769 respectively—28 culverts, extensions, Keokuk Co., to Kelley & Overman, Villisca, $12,247—12 culverts, Lee Co., to W. Denny, West Liberty, $8,694—13 culverts, Lee Co.; to Risk Constr. Co., Washington, $8,908—42 culverts, extensions, Lee Co., to G. Jordan, Centerville, $25,897—4 culverts, extensions, Mahaska Co., to J. W. Schroyer, Baxter, $849—8 culverts, extensions, Winnebago Co., to C. Jensen, Thompson, $3,300—plate girder bridge approaches, one I-beam bridge, Woodbury Co., to Lundgren-Reis Co., 125 College St., Des Moines, $27,766—15 culverts, B-45, Woodbury Co., to Christensen Bros., Tyler, Minn., $11,380. Grand total $209,569.

Kansas—State Hy. Comn., Court House, Olathe, bridge in Nemaha Co., to A. L. Cook, Ottawa, $2,726—Pottawatomie Co., to Waylord Bridge Co., Washington, $13,593—Bridge 2, Federal Aid Project 293-C, Miami Co., to J. S. Vance & Son, Parsons, $49,385—Bridge 1, Federal Aid Project 293-C, Miami Co., $11,263. Grand total $76,967.

Maine—State Hy. Dpt., Augusta, concrete bridges in Wellington, to James Frederick & Co., Pittsfield, $4,894—in Jonesport, to C. H. McNally, Ellsworth, $6,177—in Harrington, to G. W. Crane, Waterville, $20,427—in Athens, to U. Metivier, Rumford $4,695—in Alna, to Reed & Reed, Woolworth, $10,552. Grand total $46,745. Noted June 30 Daily.

Maryland—See "Streets and Roads."

Minn., St. Paul—City, steel, concrete bridge over Northern Pacific Ry. tracks near Jessamine St., in Johnson Parkway, to G. J. Grant Constr. Co., Como Ave. and Northern Pacific R.R. tracks, $41,800.

Missouri—State Hy. Bd., Jefferson City, to S. G. Hayes & Co., 910 South Michigan Ave., Chicago, Ill., 3 bridges in Cole Co. $11,039—to Gaines Bros. Co., Eldon, in Warren Co., $31,017 —to P. McGlone, Harrison, 2 in Platte Co., $16,796—to Davis Constr. Co., Boonville, 2 in Carroll Co. $17,096—to Kelly & Underwood, Granby, 2 in Oregon Co. $9,062; 3 in Newton Co. $14,733; in Texas Co. $30,588—to Winstead & Gunther, Siloam Springs, Ark., Jasper Co., $1,992—to E. L. Markham, Cape Girardeau, 6 in Dunklin Co. $20,246. Grand total $153,169. Noted June 18.

STREETS AND ROADS

BIDS ASKED

Connecticut—Aug. 3 by J. A. Macdonald, Hartford, state hy. comr., trap rock waterbound macadam paving 3,105 ft. hy. Newtown, State to furnish rein.-con. pipe—gravel surfacing 12,500 ft. Ashford—10,065 ft. Bridgewater—13,700 ft. Chaplin, state to furnish bituminous coated corrugated metal pipe on foregoing—gravel surfacing 20,300 ft. Colchester—9,800 ft. Old Saybrook—34,640 ft. Southbury, State to furnish rein.-con pipe on foregoing—loose trap rock paving 17,424 ft. East Granby; adv. E.N.-R. July 30.

Delaware—Aug. 19 by State Hy. Dpt., Dover, grading, 50,000 cu.yd. Indian River Inlet, Contr. No. 1 (N-4)—grading, concrete sidewalks, concrete curbing, concrete paving 850 cu.yd Marshallton Cutoff, contr. 144B—1,250 cu.yd. Dorman St., Harrington, Contr. 199—grading, concrete paving 1,000 cu.yd. William and Cedar Sts., Bridgeville, Contr. 200—500 cu.yd. School St., Millsboro, Contr. 202—30 tons fertilizer and 1 ton assorted seed, Contr. U—Appoquinimink and Drawyers Creek Bridges, Contr. 182B; adv. E. N.-R. July 30.

Ill., Chicago—Bd. Comrs. Cook Co., County Bldg., taking bids paving Southwest Hy., gaps at Kean Ave. and 84th St.—2.77 mi. Sherer Ave., from Lake Ave. to Walters St.—1.03 mi. Wolf Rd., from Randolph St. to North Ave.—1.09 mi. 67th St., from Cicero to Crawford Aves. —123rd St., gap at Southwest Hy.—3.02 mi. Burnham Ave. and Avenue O, from 106th to 130th Sts.—1.26 mi. Ave. L, from 106th to 95th Sts.—0.3 mi. 76th St., from Cottage Grove Ave. to Dawson St. $500,000. D. M. Campbell, assistant hy. supt.

Ill., Edwardsville—Bd. Comrs. Madison Co. taking bids grading, rein.-con. paving 2.77 mi. road between Prarie Town and Route 112, 18 ft. W. E. Howden, Court House, supt.

Ind., Brookville—Aug. 3, by Bd. Coms., Franklin Co., concrete surfacing J. A. Dudley Rd., Richland and Brookville, Twps., $51,738. W. F. Flack, Brookville, co. aud.

Ind., Ft. Wayne—Aug. 4, by Bd. P. Wks., improving 3 alleys, Douglas Ave., Howard and Brackennage Sts. Est. exceeds $25,000. S. S. Snyder, Ft. Wayne, secy.

Ind., Goshen—Aug. 3, by Comrs. Elkhart Co., concrete paving County Unit Road 16. M. E. Croop, Goshen, aud.

Ind., New Albany—Aug. 3, by Comrs. Floyd Co., concrete paving Scottsville, Navilleton, Cunningham and Sarles Rds. $25,000. C. F. Finch, New Albany, aud.

Ind., Princeton—Aug. 4, by Bd. Comrs., Gibson Co., concrete paving Hugo Schumacher and William Martin Rds. $38,925. S. G. Marshall, Princeton, co. engr.

Ind., Scottsburg—Aug. 3, by Bd. Comrs. Scott Co., stone surfacing. W. O. Green Rd., graveling J. W. Irwin Rd. To exceed $25,000. F. Robertson, Scottsburg, aud.

Ind., South Bend—Aug. 3, by St. Joseph Co. concrete paving Madison and Ironwood Rds., $24,400 — Harrison Rd., 17,300 — Riley Rd., $11,600. F. P. Crowe, South Bend, co. aud.

Ind., Valparaiso — Aug. 4, by Bd. Comrs, Porter Co., concrete paving 1.346 mi. William J. Ameling Rd., $41,357. C. A. Blachly, Valparaiso, aud.

Kansas—Aug. 4, by State Hy. Comn., Court House, Erie, bituminous blotter treating 2.246 mi. K. Projects 16 and 1214 Montgomery Co.—31.321 mi. K. 160, 1165, U. S. Hy. 73-W, K. 1219, 1187, and 1188, Crawford, Labette and Neosho Counties—20.323 mi. U. S. Hy. 54, K. 1193 and 1194, Greenwood Co.—25.354 mi. U. S. Hy. 73-W, K. Project 1189 and U. S. Hy. 73-E K. Project 1190 and 1191, Labette and Cherokee Counties. W. V. Buck, Topeka, hy. engr.

Kansas—Aug. 5, by State Hy. Comn., Court House, El Dorado, bit. blotter treating 15.53 mi. U. S. Hy. 54, Kansas Project 1218, Pratt Co.—30.279 mi. U. S. Hy. 59, Kansas Project 1206 and U. S. Hy. 77, Kansas Project 1207, Butler Co.—8.329 mi. U. S. Hy., 50-S, Kansas Project 1208 Edwards Co., W. V. Buck, Topeka, hr. engr.

Maryland—Aug. 4 by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete header and base, concrete shoulders, 2.05 mi. Contr. B-218-411 Baltimore Co.—gravel surfacing 0.95 mi. Contr. C-52-84 and 2.05 mi. Contr. C-55-82, both Calvert Co.—macadam paving 1.69 mi. Contr. H-127-44 and 0.31 mi. Contr. H-133-44, both Harford Co.—concrete paving 7.87 mi. and concrete shoulders, 0.81 mi. Contr. Wi-79 and 8-33-13 Wicomico and Somerset Counties; adv. E. N.-R. July 30. L. H. Steuart, secy.

Md., Baltimore—Aug. 5, by Bd. Awards, grading 30,000 cu.yd. streets listed in Contr. 599; concrete paving 9,600 sq.yd. Contr. 598. N. L. Smith, Municipal Bldg., hys. engr.

Massachusetts—Aug. 4, by Dpt. P. Wks., State House, Boston, gravel and bituminous macadam paving 11,690 ft. hy. Shirley—1,440 ft. Bendon—bituminous macadam paving 8,437 ft. Belchertown—500 ft. Danvers. A. W. Dean, Dpt. P. Wks., Boston, engr.

Minnesota—Aug. 4, by State Hy. Dpt., St. Paul, grading 1.2 mi. State Project 3-24, Sectfl 2—5.3 mi. State Project 7-43 and State Project 59-27, Sect. 1—14.3 mi. State Project 9-45, Sect. 2—24.5 mi. State Project 11-42—6.8 mi. State Project 15-32, Div. A-9 mi. State Project 28-32.

Mo., Lee Summit—City Council, bids soon concrete paving streets. $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, engrs.

Streets and Roads (Continued)

New Jersey—Aug. 10, by State Hy. Comn., Trenton, grading, 9-in. rein.-con. paving 11.71 mi. Route 25, Sects. 6A, 5A and 4B, Middlesex Co.—and 3.08 mi. Route S-24, Sect. 1, Union Co. A. L. Grover, ch. clk.; adv. E.N.-R. July 30.

N. J., Margate—Aug. 6, by Bd. City Comrs., City Hall, grading, rein.-con., paving Atlantic Ave. $25,000. E. R. Rightmire, city engr.

N. J., Mountain Lakes—Aug. 4, by Mayor and Borough Council, Boro Hall, 2 Boulevard West, bituminous penetration paving 4,900 sq.yd. Pocono-Raynold Improvement. F. T. Rubidge, boro engr.

New York—Aug. 11, by A. W. Brandt, comr. Hys., Albany, improving highway in Queens Co.; adv. E.N.-R. July 30.

N. Y., Brooklyn—Aug. 5, by H. Hesterberg, pres. Brooklyn Boro. Boro Hall, grading, granite block on concrete paving Adams and South 4th Sts.; asphalt resurfacing by heater method Dorchester Rd., Prospect Pl., Newkirk, Ovington, 12th Aves., Bay 19th East 2nd, East 16th, East 28th, East 29th, 61st and 73rd Sts.; asphalt on concrete paving Clarendon Rd., Gravesend and Narrows Aves., East 45th, Smith Sts., grading, curbing, Linden Blvd., Hendrickson St.

N. Y., Mount Pleasant—Aug. 10, by Westchester County Park Comn., J. Downer, ch. engr., 72 West Pondfield Rd., Bronxville, grading, paving 0.8 mi. Bronx Parkway extension from Bway. to Saw Mill River Rd.; adv. E.N.-R. July 30.

N. Y., New York—Aug. 5, by S. Lecy, pres. Manhattan Boro. Municipal Bldg., grading, granite block on concrete paving West 43rd and 99th Sts., asphalt block on concrete paving West 150th and Sheriff Sts.; sheet asphalt on concrete paving 88th, 75th, 78th, West 111th, 88th Sts., West 5th, and 87th Aves.

N. Y., Rochester—Monroe Co. opens bids Aug. 1, curbing, paving county share pavement of St. Paul Blvd., from Cooper Rd. to Lake Ontario. $375,000. G. C. Wright, Rochester, co. engr.

N. Y., Rochester—Irondequoit Town Bd. opens bids Aug. 1, cold or hot asphalt paving St. Paul Blvd., from Cooper Rd. to Lake Ontario. $250,000-$300,000.

N. Y., St. George—Aug. 5, by J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete on concrete paving Richmond Ave. and Amboy Rd.

N. Y., Yonkers—Aug. 10, by Westchester County Park Comn., 72 West Pondfield Rd., Bronxville, grading, rein.-con. paving Cross County Parkway, from Yonkers Ave. to Broad Street Viaduct; adv. E.N.-R. July 30.

Ohio—July 31, by O. W. Merrell, dir. hys., Columbus, bituminous macadam paving 2.069 mi. Sect. "A" and Mt. Gilead, Delaware—Mt. Gilead Rd., Morrow Co., $39,822—3.564 mi. Sect. "E and Q" Cadiz—Carrollton Rd., Harrison Co., $44,241—concrete paving 2.436 mi. Sect. "N" Cleveland-Sandusky Rd., Lorain Co., $53,374, all foregoing 20 ft. wide—paving 3.015 mi. Sects. "Q-1," "Q-2" and "Q-3" Columbus-Sandusky Rd., Franklin Co., 30 ft., tar macadam, $83,972, rock asphalt $86,903.

O., Columbus—Aug. 1, by Bd. Comrs. Franklin Co., F. D. Connally, clk., grading, drainage structures, bituminous macadam paving 1.61 mi. Stimmel Rd. V2, Franklin Twp., 20 ft. $29,907.

O., Dayton—July 31, by City Comn., sheet asphalt or rein.-con. paving 14,000 sq.yd. Patterson Blvd., from Jefferson to Stout Sts. $90,000. J. F. Hale, U. B. Annex, City engr. Noted July 9.

Pennsylvania — Aug. 7, by State Hy. Dpt., Harrisburg, grading, drainage structures, one course rein.-con. surfacing 17,333 sq.yd., vitr. brick on concrete surfacing 1,696 sq.yd., relaid brick surfacing 155 sq.yd., also 24 ft. rein.-con. bridge, and 359 ft. viaduct, incl. 92 ft. through plate girder span, 7 various lengths rein.-con. approach spans, 30 ft. roadway, 5 ft. sidewalk, over Pittsburgh & Shawmut R.R., Routes 69 and 251, East Franklin and Rayburn Twps., Kittanning, West Kittanning and Applewold Boros, Armstrong Co.—grading, drainage structures, one course rein.-con. surfacing 19,380 sq.yd. Route A-8041 and 7537-B, Derry Twp., Westmoreland Co.—8,448 sq.yd., Route R-251 and A-6963-A, Sugarcreek Twp., Armstrong Co. —3,205 sq.yd. Route R-150, Bensalem and Bristol Twps., Bucks Co.—59,853 sq.yd. Route R-131, Sect. 1, East and West Nottingham Twps., Oxford Boro, Chester Co. — grading, drainage structures, bituminous treated macadam surfacing 939 sq.yd., incl. two 62 ft. 6 in. plate girder spans, 30 ft. roadway, over Tohickon Creek, Route 656, Sect. 3, Bedminster and Tinicum Twps.—1,851 sq.yd. incl. rein.-con. arch bridge, Route 150-spur, Sect. 2, both Bucks Co.—18,979 sq.yd. Route R-380, Sect. 3, Elk Co.—927 sq.yd. incl. two 45 ft. spans rein.-con. bridge, Route R-220, Sect. 3-A, Middle Smithfield Twp., Monroe Co.—grading, drainage structures, one course rein.-con., bituminous surface treated macadam or bituminous surface treated macadam on broken stone surfacing 41,052 sq.yd. Route R-756, Sect. 1, Bradford and Foster Twps., McKean Co. S. S. Lewis, secy.

Pa., Phila.—Aug. 11, by Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, grading and improving Cheltenham St. from Washington Lane to Ogontz St.—Schedule B, asphalt paving (assessment work) Belfield St. from Loudon to Logan Sts., Church Lane from Limekiln Pike to 17th St., Courtland St. from D to Hurley Sts., Erdrick St. from Foust to Vankirk Sts., Gratz St. from Limekiln Pike to Godfrey St., 17th St. from Medary to Stenton Sts., Herbert St. from Tackawanna to Valley Sts., Howard St. from Courtland to Wingohocking Sts., Limekiln Pike from Bavard to Cheltenham Sts., Mansfield St. from Washington to Duval Sts., and 12th St. from Nedro to Champlost Sts.—Schedule C, asphalt repaving Groups 1 and 2, Green St. from Berkley to Manheim Sts.—Schedule D, cleaning, painting Clarissa Street Bridge.

Pa., Wilkinsburg—Aug. 10, by J. G. Miles, secy., Boro Bldg., redressing present sandstone curb, and brick on 8 in. concrete, or brick on slag paving Franklin Ave. and Mulberry St. $30,000. C. F. Sperling, Boro Bldg., engr.

Tex., Dallas—Aug. 10, by City, constructing Corinth St. Underpass Approaches. Rollins & Clinger, Records Bldg., engrs.

Tex., Yorktown—Aug. 3, by City, c/o W. Westhoff, mayor, permanent paving 7 blocks Main St. J. M. Fenner, Cuero, engr.

Washington—State Hy. Dpt. Tacoma, bids about Aug. 8, constructing 5 mi. Lake Samish Hy. $125,000. C. McCoy, Bellingham, engr.

Wash., Asotin—Comrs. Asotin Co., bids about Aug. 8, reconstructing 7.5 mi. Anaton Dist. Hy. $35,000-$40,000. J. Swain, Asotin, co. engr.

Wisconsin—Aug. 4, by State Hy. Comn., and Wood Co. Hy. Committee, Division Office 4, Citizens Natl. Bank Bldg., Wisconsin Rapids, grading, drainage structures, curbing, guttering, concrete surfacing 13.677 sq.yd., incl. 13.677 sq.yd. steel fabric reinforcement, Port Edwards-Wood County Home Rd., S.T.H.13, State Aid Project 4646.

Ont., Hamilton—See "Contracts Awarded."

CONTRACTS AWARDED

Ark., Ft. Smith—Bd. Comrs. Paving Dists. 46 and 47, grading, curbing guttering, sewers, 6 in. concrete paving 3,140 sq.yd. with marginal reinforcing South M and South N Sts., Dist. 46, removing old curbing, guttering and paving, and recurbing, regluttering, fine grading, sidewalks, 6 in. concrete repaving 19,980 sq.yd. North A, B, C, 2nd and 6th Sts., Dist. 47, to Luke & Co., Ft. Smith, $54,671.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, bituminous treated crushed gravel or stone surfacing (plant mix) road between Colfax and Gold Run, Placer Co., to Southwest Paving Co., Washington Bldg., Los Angeles, $90,675—surfacing with selected material 4.3 mi. oiling 7.5 mi. road, between Doyle and Long Valley Creek, Lassen Co., to Capitol Constr. Co., Sacramento, $16,667—gravel surfacing 6.6 mi. road west of Williams, Colusa Co., to Capitol Constr. Co., Sacramento, $39,997 Grand total $149,675. Noted June 26.

Calif., Fresno—D. M. Barnwell, clk., Fresno Co., (Jensenite) paving 1½ mi. Mt. Whitney Ave., to Valley Paving & Constr. Co., Bank of America Bldg., $18,775. Noted June 25.

Calif., Laguna Beach—City Council, grading, 2 in. asphaltic macadam paving 990,000 sq.ft. and 1 in. asphaltic macadam paving 212,000 sq.ft. streets in Cliffs Impvt., to O. U. Miracle, 4751 Monroe Ave., San Diego, $172,435.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, sanitary sewers, storm drains, paving Harrison Ave. and Fickett Street Impvt. Dist., to G. H. Oswald, 366 East 58th St., $69,167.

Calif., Los Angeles—Petroleum Securities Co., 714 West 10th St., grading, catch basins, curbing, 6 in. concrete paving 100,000 sq.ft. Holly Vista, Belfast and St. Ives, Drives, to Griffith Co., 502 Los Angeles Railway Bldg., $27,585.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, guttering, sewers, sidewalks, ornamental lighting system, water connections, paving 3,785 lin.ft. Harrison Ave., between Indiana and De Sota Sts., to G. H. Oswald, 366 East 58th St., $69,168.

Calif., Monrovia — City Council, c/o J. H. Coombs, curbing, guttering, sewers, lighting system, incl. 40 Lalux posts, 1,135 traffic lane markers, culverts, grading, 6 in. asphaltic concrete on decomposed granite and old macadam paving 186,150 sq.ft. Foothill Blvd. between Mayflower Ave. and west city limits, to J. H. Coombs, 1224 Oxford St., Pasadena, $63,867.

Calif., Monterey—To Clark & Henry Constr. Co., Chancery Bldg., San Francisco, 1½ in. asphaltic macadam paving 60,600 sq. ft. Hoffman Ave., at $0.062 per sq. ft.; 105,200 sq. ft. David Ave., at $0.062 per sq. ft., 4 in. house connection sewers $0.90 per lin. ft.

Calif., Pasadena—Grading, curbing, walks, 7 in. concrete paving 120,000 sq. ft. Santa Ana Ave., etc., to Osborn Co., 450 California Terrace, $53,255.

Calif., Santa Cruz—Santa Cruz Co., macadam surfacing Bodfish Rd., to Granite Constr. Co., Watsonville, $31,289.

Calif., Willow Glen—City Council, to Union Paving Co., Call Bldg., San Francisco, curbing sidewalks, asphaltic concrete paving Byerly Ave. $3,913, Blewett Ave., $11,845, Kotenberg Ave. $11,058 and East Willow St. $48,725; to A. J. Ralsch, 46 Kearney St., San Francisco, West Willow St. $20,120. Grand total $95,661.

Colorado—State Hy. Comn., Denver, gravel surfacing 14.9 mi. hy. east of Rifle and 20.6 mi. hy. near Cheyenne, Cheyenne Co., to N. R. Mackey, Denver, $271,568 and $93,563 respectively.

Conn., West Hartford (br. Hartford)—Asphalt paving 14,120 sq.yd., to Edward Balf Co., 16 Haynes St., Hartford, $44,781. Est. $40,000.

Georgia—State Hy. Dpt., East Point, J. W. Barnett, engr., to Davis Constr. Co., Rhodes-Haverty Bldg., Atlanta, grading 10.166 mi. and concrete paving 5.025 mi. by Wilkes Co., $127,300; widening bridge culvert and concrete paving 5.614 mi. hy. Upson Co., $112,381—concrete paving 12.23 mi. hy. Henry Co., $175,313. 5.82 mi. DeKalb Co., $99,635. 5.47 mi. Bryan Co., $125,710; 5.614 mi. Franklin Co., $112,381—to Van Gordon Constr. Co., Jacksonville, 6.181 mi. Stewart Co., $106,966; 9.743 mi. Lee and Terrell Counties, $159,634—to A. E. Hudson Sons, Bolton, grading 5.65 mi. Haralson Co., $63,926—to M. R. Woodall & Co., 1594 Lakewood Ave., Atlanta, 4.04 mi. Cherokee Co., $56,820, to Ledbetter & Johnson, Rome, asphalt paving 2.2 mi. hy. Floyd Co., $70,225—to H. L. Dunn & Son, Dawson, widening bridge and limerock surfacing 8.927 mi. Early Co., $171,223—to Broadbent Constr. Co., Ocala, Fla., limerock surfacing 7.994 mi. Bacon Co., $173,217—to J. Monaghan, Pelham, 6.759 mi. Coffee Co., $46,610—to W. C. Shepard, 347 Elizabeth St., N. E., Atlanta, grading 8.312 mi. and 1 bridge, Carroll Co., $90,167—to R. T. Smith, Macon, grading 4.25 mi. Federal Aid Project 86, $54,111; 4.7 mi. Federal Aid Project 85, $50,942 and 3.9 mi. Federal Air Project 87, $55,744 in Haralson Co.—to Davis & Co., Moultrie, constructing 2 bridges Schley Co., $18,814. Grand total $1,870,949. Noted July 2.

Georgia—State Hy. Dpt., East Point, J. W. Barnett, engr., concrete paving 6.658 mi. hy., and constructing 3 bridges, Cusseta-Richland Rd., Chattahoochee Co., to Whitely Constr., La Grange, $133,690—concrete paving 4.408 mi. Stephens Co., to Roberts Paving Co., Salisbury, $93,637—asphalt on limerock paving 9.8 mi. Baldwin Co., to H. L. Dunn & Son, Dawson, $179,923—grading 8 mi. Montgomery and Toombs Counties, also grading 7.646 mi. hy. and 3 bridge culverts on Alamo-Mt. Vernon Rd., Wheeler Co., to Newell Constr. Co., Greenville, S. C., $49,244 and $79,274 respectively. Grand total $535,767. Noted July 2.

Idaho—A. Harbour, comr. P. Wks., Boise, grading, oil processing 12.5 mi. Malad-Utah State Line Hy., Oneida Co., to Morrison-Knudsen Co., 319 Bway., Boise, $29,255. Est. $33,323. Noted June 29.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 0.12 mi. road in Bond Co., to Louis Rich Constr. Co., 2038 St. Clair Ave., East St. Louis, $2,198—0.11 mi. DuPage Co., to E. D. Otto, Downers Grove, $7,214—2.71 mi. Route 58, Sect. 585 and 0.92 mi. Route 54, Sect. 541-X, both Cook Co., to Municipal Paving Co., 1106 North Boulevard, Oak Park, $109,445 and $28,996 respectively—12.46 mi. Cumberland and Jasper Counties, to J. I. Ransome, Inc., Palestine, $179,575 — 7.67 mi. Route 146, Sects. 111 and 111-K, Johnson & Pope Counties, to Reganhardt Constr. Co., Cape Girardeau, Mo., $93,013 and $25,385 respectively—6.51 mi. Lake Co., to R. Mann, 2331 Charles St., Rockford, $149,853—widening Route 28, Sect. 1-W-1, Knox Co., to Graham-King Constr. Co., 550 South Cedar St., Galesburg, $1,100—paving 3.19 mi. Lake and Cook Counties, and 2.1 mi. Cook Co., to Milburn Bros., Mt. Prospect, $91,674 and $31,782 respectively—0.4 mi. Wabash Co., to H. W. Ripp & Co., Mt. Carmel, $15,101—4.8 mi. Knox and Stark Counties, to M. Hayes & Sons Co., 209 South La Salle St., Chicago, $84,898—2.82 mi. Hancock and McDonough Counties, to Cast Stone Constr. Co., Bloomington, $50,313—2.68 mi. White Co., to Brinkhoff & Menk, Paris, $43,610 —grading, culverts 5.33 mi. Johnson Co., to A. A. Davis Co., Union, Mo., $77,461—2.46 mi. Union Co., to J. J. McCaughey, 189 West Madison St., Chicago, $28,650—widening 2¼ in. brick paving 8.07 mi. Clark Co., to R. P. Devine, Warsaw, $195,850. Grand total $1,216,117. Noted June 4.

Ind., Evansville—Bd. Comrs. Vanderburgh Co., rock and gravel surfacing J. F. Grimm Rd., and concrete surfacing Posey Ave. Rd., to Globe Constr. Co., 2307 West Franklin St., $45,893 and $9,590 respectively; ests. $45,893 and $9,590 respectively—asphaltic concrete surfacing Richardt Ave., to Reichert Constr. Co., 418 Northwest Riverside St. $19,970, est. $20,000. Grand total $72,850. Noted June 18.

Iowa—State Hy. Comn., Ames, to C. F. Lytle Constr. Co., Sioux City, paving 2.954 mi. roads in Winnebago Co. $64,448—to F. C. Bretz, Ayrshire, grading 4.907 mi. Van Buren Co. $16,159—to Dixon & Colgan, Mystic, gravel surfacing 6.72 mi. P-492 $5,170, 2.6 mi. P-227-C $2,304, both Appanoose Co.—to W. T. Kelley, Des Moines, 1.64 mi. P-650 $2,045, 1.35 mi. P-506 $1,841, both Clark Co., 2.4 mi. Van Buren Co., $5,159—to Lyman Richey Sand & Gravel Co., 712 Bankers Reserve Life Bldg., Omaha, Neb., 5.6 mi., Page Co. $7,545. Grand total $104,671.

Ia., Dubuque—Auditor Dubuque Co., grading 150,000 cu.yd. Trunk Road G from Cascade to Farley, to Krysan & Cremer, Calmer, $24,775—bridge and culvert, Items 1, 2, 3, 4, 5, 9, 10, 11, 12 and 13, to T. Fisko, Garber, $5,436—Items 6, 7, 8 and 14, to J. F. Lee Paving Co., Dubuque, $10,225. Grand total $40,436. Noted June 18.

Ia., Elkador—Bd. Supervs., Clayton Co., surfacing secondary roads, to F. J. Balmer, Waterloo, $34,056.

Ia., Fairfield — Jefferson Co., grading and bridge filling roads, to E. Hines, Buffalo Center, excavating at $0.75 cu.yd. loose and $1 cu.yd. sold rock; earth at $0.135 per cu.yd. Noted June 30 Daily.

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Streets and Roads (Continued)

Ia., Mason City—City Council, rein.-con. paving 1 alley, 9th St. S.E., 2nd St., South Crescent Dr., South Jersey and South Maryland Aves., to Henkel Constr. Co., Mason City, $18,509. Same contractor also awarded concrete sidewalks on various streets.

Ia., Sioux City—E. V. Moone, city clk., concrete paving 6,800 sq.yd. Isabella St., also paving 1 alley and South Alice St., to Harrington & Jorgensen, 3904 6th Ave., $13,084 and $8,204 respectively—8,500 sq.yd. Ridge Ave. and Summit St., to Hansen & Wesley, 1616 West 5th St., $5,001 and $4,511 respectively. Grand total $40,800. Noted June 24.

Ia., Storm Lake—Buena Vista Co., improving 25 mi. roads, incl. 30,000 cu.yd. gravel surfacing, 148,600 units ¼ mi. overhaul, 9,800 cu.yd. stripping, to Furgerson Constr. Co., Dana, C. A. Emery, Coon Rapids, Paul & Donley, Ft. Dodge, Sargent Bros., Des Moines, E. L. McRea, Lake View and A. L. Albrecht, Storm Lake.

Kansas—State Hy. Dpt., Court House, Olathe, **(F.A.P. means Federal Aid Project. K.P. means Kansas Project)** grading, drainage structures, concrete paving 0.162 mi. K.P. 1171 and 0.282 mi. F.A.P. 321-E, both Wyandotte Co., to C. F. Brindle, Kansas City, $5,197 and $9,882 respectively—1.078 mi. Miami Co., and grading, drainage structures 6.467 mi. Nemaha Co., to A. L. Cook, Ottawa, $44,309 and $42,648 respectively—concrete paving 6.401 mi. Franklin Co., to Cook & Stucker, Ottawa, $140,170—0.18 mi. F.A.P. 246-E Johnson Co., to Du Bois & Co., Pittsburgh, $3,382—0.772 mi. F.A.P. 404-D and 0.392 mi. same road, Sect. C, both Johnson Co., to Harrison Eng. & Constr. Co., 506 Mutual Bldg., Kansas City, Mo., $21,223 and $12,235 respectively—grading, drainage structures 1.856 mi. Pottawatomie Co., to H. J. Hall, Manhattan, $19,205—0.450 mi. Lyon Co., to Kreis Contg. Co., Council Grove, $13,004. Grand total, $311,255.

Kan., Wichita—For 6 in. rein.-con. paving 15,000 sq.yd. Bayley, Fern, Osie and 13th Sts., Dodge, Elizabeth and Waco Aves., to Globe Constr. Co., 1069 North Water St., $40,000.

Louisiana—State Hy. Comn., Baton Rouge, to Sullivan, Long & Haggerty, Bessemer, Ala., concrete surfacing 2.1 mi. Arcadia Rd. Bienville Parish, $40,130. 3.2 mi. Ringgold Rd. Bienville Parish $40,130. 4.7 mi. De Soto Parish $90,168. 5.3 mi. Sabine Parish $96,981—to N. V. Duncan, Chicago, Ill., 3.636 mi. Sabine Parish $84,745. 3.1 mi. DeSoto Parish $67,136—to A. C. Campbell, Winnfield, 11.4 mi. Red River Parish $237,070—to A. N. Goldber, Inc., 11.412 mi. Red River Parish $218,780—to S. E. Johnson Co., Laskey Rd., Toledo, O., 16.988 mi. Catahoula and Concordia Parishes, $298,974—to C. E. Collins, Natchitoches, gravel surfacing 8.398 mi. DeSoto and Natchitoches Parishes $34,890—to H. E. Machen, Winnfield, 7.48 mi. Beauregard Parish $27,556—to LeHate & Bertrand, Ville Platte, 5.952 mi. Evangeline Parish $22,949—to Caldwell Bros. and Bond Bros., 816 Howard Ave., New Orleans, sub-grade treating 10.891 mi. Jefferson and St. Charles Parishes $51,865—to W. P. Villere, New Orleans, grading, asphaltic surface treating Industrial Canal Bridge approaches Orleans Parish, $103,532—to Nelson Bros., Baton Rouge, asphaltic surface treating 11.6 mi. St. Tammany Parish, $95,077—to N. P. Turner, Marshall, Tex., 0.78 mi. Calcasieu Parish $8,651—to Highway Eng. & Constr. Co., Selbyville, 25.07 mi. St. Martin Parish $306,248—to Leathers & Martin, Alexandria, gravel surfacing 7.138 mi. Richland and Franklin Parishes $46,843, 6.607 mi. Livingston Parish $52,252—5.885 mi. West Carroll Parish $26,428—to F. Lahaye & Fontenot, Ville Platte, 9.1 mi. Evangeline Parish $31,371—to T. W. Kleinpeter, Baton Rouge, 4.101 mi. St. Landry Parish $15,471—to R. C. Webb, Hanson & McCorkle, Delta, 7.563 mi. Union Parish $73,807—to J. B. LeBlanc Constr. Co., Baton Rouge, 8.944 mi. Catahoula Parish $4,070—to N. A. Russel, Afton, 4.6 mi. Catahoula Parish $3,129—to Hemington Bros., Tallulah, 9.7 mi. Richland Parish $25,810—to Wimberly Constr. Co., Arcadia, 4.843 mi. Natichitoches Parish $25,636—to J. W. McKeithen, Grayson, grading, drainage structures 9.150 mi. Kelly-Sikes Rd. $49,796, grading, gravel surfacing 7.1 mi. Start-Caldwell Hy. $33,413, both Caldwell Parish—to Swinney & Coleman, Opelousas, grading, drainage structures 11.6 mi. St. Landry, Evangeline and Acadia Parishes, $84,681—to P. & D. Co., Baton Rouge, 15.2 mi. St. Landry and Point Coupe Parishes $270,368—to N. H. DeBritton, Baton Rouge, shell surfacing 7.102 mi. Terrebonne and Lafourche Parishes $59,570—to L. M. Goldberg, Abbeville, 5.7 mi. Vermillion Parish $25,997. Grand total $2,653,502. Noted June 25.

La., New Orleans—City Council, to H. P. and J. F. Egan, New Orleans, installing sub-surface drains, manholes, handholes, clean out, 5,223 ft. Jena St. from Magazine to Freret Sts. and 1,308 ft. Pine St. from Broad Pl. to Colapissa Sts. $26,020, 4,844 ft. 2nd St. from St. Charles St. to South Clairborne Ave. and 2,769 ft. Zimpel St. from Bway. to South Carrollton Aves., $26,200—to Southern Uvalde Rock Asphalt Co., New Orleans Bank Bldg., Uvalde rock asphalt wearing surface on 4,080 sq.yd. Drexel Ave. from Franklin Ave. to Peoples Aves., $19,690, bituminous concrete wearing surface 4,140 sq.yd. Pine St. from Broad Pl. to Colapissa St. $18,570, 5,040 sq.yd. 2nd St. from La Salle St. to South Clairborne Ave. $20,860—to Con-

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crete Constr. Co., New Orleans, concrete sidewalks 3,372 ft. Galvez St. from St. Bernard Ave. to Elysian Field, $6,870, 1,816 ft. Jackson Ave. from Baronne to La Salle Sts. $3,630, 1,865 ft. Jackson Ave. from Freret to South Galvez Sts. $6,040, 5,223 ft. Jena St. from Magazine to Freret St. $11,650—to M. S. Flynn, New Orleans, brick paving 4,200 sq.yd., North Front St., $25,960. Grand total $169,490.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 1.2 mi. Contr. Wi-78-17 Wicomico Co., to Layfield & Waller Paving Co., Salisbury, $16,558—1.04 mi. Contr. C1-96052 Carroll Co., to H. J. Williams & Co., York, Pa., $17,419—1.57 mi. Contr. B-197-44, Baltimore Co., to Development & Contg. Co., American Bldg., Baltimore, $25,599. Grand total $59,576. Noted July 9.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., Baltimore, concrete paving 0.75 mi. Contr. M-100-52, Montgomery Co., to Caton Contg. Co., Halethorpe, $19,112. Noted July 9.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 400 lin.ft. Cont. Ho-99-38, Howard Co., to Christhilf & Ensey Co., 1625 Ridgely St., Baltimore, $5,547—concrete shoulders and sheet asphalt paving 0.74 mi. Contr. BC-107-72, Baltimore City, to P. Flanigan & Sons, Harford Rd. and Baltimore & Ohio R.R., Baltimore, $47,523—repairing hy. bridge over South River, Contr. AA-125-711, Anne Arundel Co., to Smith Bros., Galesville, $3,440. Grand total $56,510. Noted July 16.

Maryland—State Roads Comn., G. C. Uhl, chn., concrete paving 4.83 mi. Contr. Co-70-22, Caroline Co., to Hanneman-Burroughs Co., Salisbury, $65,357. Noted June 22 Daily.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 1.42 mi. Contr. Wi-77-12, Wicomico Co., to Phillips Bros., Salisbury, $22,954. Noted July 2.

Massachusetts — Dpt. P. Wks., bituminous macadam paving 20,854 ft. hy., incl. rein.-con. arch bridge and 2 steel stringer bridges, Canton, Westwood and Dedham, to Lee Constr. Co., Inc., 133 Southampton St., South Boston, $326,097; rein.-con. and bituminous macadam paving 27,748 ft. rein.-con. slab bridge and 2 steel stringer bridges, Foxboro, Sharon, Walpole and Wrentham to State Constr. Co., Inc., 509 Main St., Saugus, $441,548. Noted July 2.

Massachusetts—Metropolitan Dist. Comn., 20 Somerset St., Boston, bituminous macadam paving 5.2 mi. hy. and 3 span rein.-con. girder bridge, Ware and Belchertown, to Lane Constr. Corp., 37 Colony St., Meriden, Conn., $208,381. Noted July 9.

Massachusetts—Dpt. P. Wks., A. W. Dean, engr., State House, Boston, bituminous macadam paving 3,600 ft. hy. in Milford, to J. F. Nagle, Coffin Bldg., New Bedford, $20,492; 3,150 ft. Norwood, to Smith Constr. Co., Granite Block, Fall River, $15,860. Noted July 8 Daily.

Massachusetts—Dpt. P. Wks., State House, Boston, A. W. Dean, engr., bituminous macadam paving 6,645 ft. hy., Middleboro, to Powers Bros., Brockton, $26,844; 5,500 ft. Wayland, to W. & L. Eng. Co., 694 Washington St., Boston, $32,656.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., recut granite block paving Rutherford Ave. etc., Charlestown, to C. Repucci, 10 Garden Court, $45,268.

Mass., Boston—Dpt. P. Wks., J. R. Rourke, comr., sheet asphalt paving Chittick Rd., etc., Dorchester and Roxbury, to C. Capone, 11 Hemlock St., West Roxbury. Est. $25,000. Noted June 18.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Alameda St., Roslindale, to Appel & O'Toole, 78 Moreland St., Roxbury, $19,492, est. $25,000; Hancock St., Dorchester, to Baker Constr. Co., 1578 Tremont St., Boston, $21,997 est. $25,000.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Arborway, East Dr., to Warren Bros. Road Co., 38 Charles River Rd., Cambridge, $41,970.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Washington St., Ward 17, to C. Capone, 11 Hemlock St., West Roxbury, $40,606.

Mass., Brookline — Town, Bd. Selectmen, bituminous macadam paving Sargent and Chestnut Sts., to University Excavating Co., 38 Sacramento St., Cambridge. Est. $25,000.

Mass., Milton (br. Boston) — Metropolitan Dist. Comn., 20 Somerset St., Boston, bituminous macadam paving Chickatawbut Rd., to University Excavating Co., 38 Sacramento St., Cambridge, $22,036.

Mass., Somerville—Metropolitan Dist. Comn., 20 Somerset St., widening, bituminous macadam paving 33,800 sq.yd. Alewife Brook Parkway, Somerville and Cambridge, to Simpson Bros., 77 Summer St., Boston, $70,955.

Michigan—H. G. Oakes, division engr., Plymouth, shaping, widening, concrete paving 2.612 mi. F033-24C-8 and M033-24C-9 and M019-22C-5, Ingham and Clinton Counties, to P. Vander Veen & Sons, Grand Rapids, for State Hy. Comn., Lansing, $76,995. Noted June 25.

Michigan—J. T. Sharpensteen, division engr., Escanaba, grading, drainage structures, 9.741 mi FO22-26C-1, Dickinson Co., to Bacco Constr. Co., Iron Mountain, for State Hy. Comn., Lansing, $115,176. Noted June 11.

Minn., St. Paul—City, paving, etc., Third St. Esplanade, Proposition No. 5, to W. W. Magee, Commercial State Bank Bldg., $161,000.

Missouri—State Hy. Bd., Jefferson City, to C. W. Rose, Brookfield, chats surfacing 3.254 mi. Clay Co. $1,347; 3.172 mi. Clay Co. $1,296, graveling 3.77 mi. Linn Co. $17,333; grading 3.674 mi. Worth Co. $9,588; 4.774 mi. Linn Co. $1,097; 1.326 mi. Linn Co. $296—to B. F. Brooks Constr. Co., Love Field, Dallas, Tex., crushed stone paving 4.082 mi. Cooper Co. $19,370—to C. E. Rich & Co., Tracy, 1.77 mi. Ste. Genevieve Co. $9,105—to Ray & Son, Inc., Louisiana, graveling 1.981 mi. Audrain Co. $927—to Winstead & Gunter, Siloam Springs, Ark., graveling and crushed stone paving 3.96 mi. Jasper Co. $10,277; 3.408 mi. Jasper Co. $11,047; 4.339 mi. Jasper Co. $13,687—to Perry McGlone, Harrison, grading 4.607 mi. Platte Co. 39,878; 4.57 mi. Platte Co. $26,373—to H. Tidd, Hutchinson, Kan., 0.718 mi. Linn Co. $3,796—to L. W. Hayes Constr. Co., Bethany, graveling 3.959 mi. Knox Co. $2,337; 4.053 mi. Knox Co. $2,335; 4.335 mi. Knox Co. $2,559—to S. G. Hayes & Co., 910 South Michigan Ave., Chicago, Ill., 2.676 mi. Cole Co. $19,523; 4.328 mi. Cole Co. $13,830; 2.439 mi. Cole Co. $10,041—to Gaines Bros. Co., Eldron, 1.336 mi. Warren Co. $4,739; 2.048 mi. Camden Co. $10,734; 2.923 mi. Camden Co. $13,124; 4.062 mi. Warren Co. $38,715—to Kelly & Underwood, Granby, 1.515 mi. Texas Co. $1,522; 3.433 mi. Howell Co. $24,247; 3.153 mi. Oregon Co. $17,285; 0.681 mi. Texas Co. $25,111; 2.979 mi. Oregon Co. $23,574; grading, concrete paving 1.392 mi. Newton Co. $42,869—to Davis Constr. Co., Inc., Boonville, 3.945 mi. Carroll Co. $24,929; 2.567 mi. Carroll Co. $24,724; 4.93 mi. Carroll Co. $31,998; 4.542 mi. Carroll Co. $51,040—to A. A. Davis Co., Inc., Cotton Grain Exch. Bldg., Oklahoma City, Okla., 2.896 mi. Osage Co. $34,548; 2.111 mi. Osage Co. $29,843; 4.143 mi. Osage Co. $55,350—to E. L. Markham, Cape Girardeau, 4.99 mi. Dunklin Co. $51,995; 4.881 mi. Dunklin Co. $55,829; 4.978 mi. Dunklin Co. $58,226—to A. E. Walesby, Independence, 1.364 ft. guard fence, Lafayette Co. $1,159. Grand total $820,273. Noted June 18.

Mont., Glendive—City, curbing, guttering paving 10,559 sq.yd., to Larson-Erling Co., 519 Security Natl. Bank Bldg., Sioux Falls, S. D., $23,557.

New Hampshire—State Hy. Dpt., Concord, 3 in. on 6 in. gravel surfacing 3,955 cu.yd. Carroll Co., R. D. Gillete Constr. Co., Westfield Mass., $10,146 est. $13,000; 6 in. one course rein.-con. on 8 in. gravel base course surfacing 21,994 sq.yd. Rockingham Co., to Central Constr. Co., Lawrence, Mass., $43,774 est. $50,000. Noted June 25.

New Jersey—Joint Bd. Comrs. and Council of West New York and Guttenberg, Municipal Bldg., West New York, grading, curbing, sidewalks on Bway., to New Jersey State Constr. Co., Jackson St., West New York, 78% engr. est. $25,000. Noted July 3.

N. J., Hackensack — Hackensack Impvt. Comn., Municipal Bldg., widening, granite block on concrete paving Main St., to DiBrigida & Sons, Inc., 65 Hudson St. Est. $25,000. Noted July 2.

N. J., Hackensack—Bergen Co., Court House, sheet asphalt on concrete paving Passaic St., to G. M. Brewster & Son, 253 West Fort Lee Rd., Bogota, $77,763. Noted July 2.

N. J., Jersey City—Bd. City Comrs., City Hall, regulating, sheet asphalt on concrete paving Newkirk St., to Municipal Constr. Corp., 26 Veterans Sq., $25,837. Noted July 2.

N. J., Jersey City—Bd. Freeholders Hudson Co., Court House, Jersey City, grading, stone block on concrete paving Hillside Rd. and Hudson River Turnpike, to Clinton Asphalt Co., 308 16th St., Union City, $568,946. Noted July 2.

N. J., Jersey City — Bd. City Comrs., City Hall, regulating, sheet asphalt on concrete paving Steuben and Morgan Sts., to Municipal Constr. Corp., 26 Veterans Sq., $31,212. Noted July 2.

N. J., Mountain Lakes—Bd. City Council, 2 Boulevard West, grading, curbing, sidewalks, bituminous penetration paving 17,200 sq.yd. Tower Hill Lookout Impvt., to H. B. McDonald Constr. Co., Intervale Rd., Boonton, $39,753.

N. J., Weehawken—Township Comn., Municipal Bldg., grading, sheet asphalt on concrete paving Gracie Pl., to M. Volpi, 4810 Hudson Blvd., West New York. Est. $25,000. Noted July 3.

N. J., West Paterson—Passaic County Park Comn., 45 Church St., Paterson, 9.675 ft. bituminous macadam road, cold asphalt emulsion process in Garret and Mountain Reservation, to P. S. Kramer, 45 Church St., Paterson. $37,245. Noted July 2.

New York—A. W. Brandt, comr. Hys., Albany, bituminous macadam paving 0.98 mi. Nassau Co., to Dempsey & McCarthy, Inc., 441 20th St., Brooklyn, $26,185, est. $32,053—0.18 mi. Livingston Co., to Clarence A. Foote & Son, Mount Morris, $28,259 est. $52,815—5.79 mi. Erie Co., to C. D. Ream, Kenmore, $339,324 est. $505,808—0.2 mi. Livingston Co., to Curry & Macy, Inc., 8 Exchange St., Rochester, $17,765 est. $28,514—concrete paving 2.25 mi. Albany Co., to E. V. Carey, 17 Erie St., Albany, $79,109 est. $110,958—6.38 mi. Schuyler Co., to Stento & Sarafini, 60 Exchange St., Rochester, $232,561 est. 331,820—8.01 mi. Columbia Co., to A. Celarussio & Son, Inc., Hudson, $289,835 est. $460,176—1.64 mi. Schuyler Co., to A. T. Joint, Savona, $80,956 est. $103,058—1.71 mi. Suffolk Co., to R. W. S. Corp., Huntington, $99,129 est. $139,100—0.45 mi. Westchester Co., to Garofano Constr. Co., 708 South Columbus Ave., Mt. Vernon, $73,642 est. $103,052. $1,266,855. Noted June 18 and 25.

Streets and Roads (Continued)

O., Cincinnati—Comrs. Hamilton Co., concrete curbing, guttering, cement sidewalks, grading, concrete paving 40,500 sq.yd. Euclid Rd. to J. L. Radabaugh, Montgomery Rd., Montgomery, $95,515. est. $127,631. Noted July 2.

O., Cleveland—Oil asphalt paving East 106th St., to F. W. Stollfus, 1929 Schaaf Rd., $10,-886: East 83rd St., to Bentley Bros., Hanna Bldg., $12,963.

O., Medina—Comrs. Medina Co., limestone surfacing incl. 12,170 cu.yd. stone, 10.135 mi. Brunswick-Hinckley Line Rd. here and in Wadsworth, to H. F. Spiker, Perrysburg, $19,038—13.339 mi. roads in Sharon Twp., along Wadsworth-Gulf Rd. Line, and in Granger, to F. O. Bohley, Medina, $25,616—grading, drainage structures, gravel surfacing 12.394 mi. secondary roads in Harrisville, Westfield, Chatam and Guilford Twps., to E. H. Diebel, Medina, $23,701. Grand total $68,355.

O., Port Clinton—Comrs. Ottawa Co., bituminous macadam paving 0.95 mi. Toussaint Rd., to Weis Bros. & Burman, $4,656—0.95 mi. Plasterbed Rd., and 4.13 mi. Nissen Rd., to H. W. Bergman, Port Clinton, $4,735 and $19,048 respectively. Grand total $28,439.

Ore., Portland—City Comn., removing track, repaving 10,480 ft. 4th St., to Municipal Paving Plant, Portland; $31,639. Est. $43,875.

Pennsylvania—State Hy. Dpt., Harrisburg, concrete surfacing 15,490 sq.yd. Route 18, Lycoming Co., to Colonial Constr. Co., Arrott Bldg., Pittsburgh, $38,565—grading, waterbound macadam surfacing 6,857 sq.yd. Route 521, Jefferson Co., to Lord & Quigley, Mifflin, $15,156—64,923 sq.yd. Route 283, Columbia and Northumberland Counties, to F. D. Kessler, Northumberland, $120,575. Grand total $174,296. Noted July 2.

Pa., Etna—Bd. Comrs. Allegheny Co., brick on concrete paving Hickory, Oakland and High Sts., to J. and R. Very, 701 Hays St., Pittsburgh, $22,000. Est. $25,000.

Pa., Phila.—Dept. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., Schedule A, paving Rising Sun Ave. from Alney to Adams Aves., to Achione Contg. Co., 1607 McKean St., $15,454; Schedule B, grading Rising Sun Ave. from Bristol to Wingohocking Sts., to M. Masse, 3936 West Reese St., $585.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., asphalt paving (assessment work) Maryland St. from 75th Ave. to Cheltenham St. and asphalt repaving 20th St. from McKean to Mifflin Sts., to Union Paving Co., Broad and Stiles Sts., $6,324 and $4,539 respectively—Walnut St. from 22nd to 24th Sts., to Municipal Constr. Co., Washington Square Bldg., $10,911. Grand total $21,774. Noted July 9.

South Carolina—State Hy. Dpt., Columbia, to Langston Constr. Co., Orlando, concrete paving 8.2 mi. Routes 8,183 Pickens Co., $117,537; bituminous surfacing 11.2 mi. Route 9, $110,-748 and 23.7 mi. Route 40, $222,079, both in Horry Co.—to Sutton BBros., Inc., Stahlman Bldg., Nashville, Tenn., bituminous surfacing 18.9 mi. Routes 14 and 183, Pickens Co., $216,-469—to Copeland-Wey, Inc., Atlanta, Ga., 17 mi. Route 49, Horry Co., $111,532—to Palmer Constr. Co., Florence, constructing 125 ft., rein.-con. bridge over Rocky Creek, Rte. 9, Chester Co., $7,319. Grand total, $785,784. Noted June 4.

Tex., Bay City—Matagorda Co., concrete paving 4,670 ft. 8 ft. wide, and 2,600 ft. 18 ft. wide road from State Hy. 58 to Bucks Bayou, to Russ Mitchell Inc., 710 Petroleum Bldg., Houston, $20,890, and for hauling shell $7,436.

Tex., Beaumont—City, c/o P. H. Millard, mgr., 2 in. asphalt on 8 in. rock base paving 22 blocks Madison, Grove and Burt Sts., to S. hambaugh, Beaumont, $62,517. Noted June 18.

Tex., Galveston—Galveston Co., I. Predecki, aud., bituminous surfacing 18.5 mi. League City-Friendswood Rd., Texas City-La Marque Rd. and Dickinson-Alta Loma Rd., to Haden & Austin, Post-Dispatch Bldg., Houston, $27,000. Noted June 25.

Tex., Houston—For 2 in. asphalt on 6 in. concrete paving Houston Ave. from Washington Ave. to Spring St., to National Paving Co., 112 Buffalo St., $36,608. Est. $45,000.

Utah—State Rd. Comn., Salt Lake City, concrete paving 1.444 mi. Murray-Midvale Junction Rd., to Young & Neilson, Richfield, $51,635. Est. $59,943.

Utah — State Rd. Comn., Salt Lake City, widening, grading 0.729 mi. roads, also concrete bridges, Boxelder Co., to F. S. Whiting, Kaysville, $23,996; est. $29,257; 43 ft. concrete bridge over Pangvitch Creek, 26 ft. concrete bridge over Sand Wash, Garfield Co., to Young & Ogden, Richfield, $6,484 est. $7,911.

Utah—State Rd. Comn., Salt Lake City, concrete paving 16,200 sq.yd. and bituminous concrete paving 62,200 sq.yd. road between Salt Lake City and Murray, Salt Lake Co., to Gibbons & Reed, Continental Bank Bldg., Salt Lake City, $86,697. Est. $95,517.

Virginia—State Hy. Dpt., Richmond, grading, drainage structures, surfacing 0.637 mi. Route 715, Project S-686-A, Albermarle Co., to Hall & Mitchell, Keswick, $12,137—bridge over Chickahominy River, near Glen Allen and bridge over Stoney Run, near Ashland, to Perkins-Barnes Constr. Co., Inc., Blackstone, $6,758 and $2,939 respectively. Grand total $21,834. Noted July 9.

Wash., Colville—Stevens Co., grading, crushed rock surfacing 5.4 mi. Lateral Hy 3, to J. H. Collins, Colville, $27,429.

Wash., Selah—City Comrs., grading, concrete sidewalks, concrete paving 10,200 sq.yd. Main St., et al to J. DeBlazio, Yakima, $30,355.

Wash., Tacoma—Pierce Co., Court House, paving 1.53 mi. Wilt-Hegele Rd., to J. Warter, Tacoma, $30,850. Est. $30,000.

Wash., Walla Walla—City Comrs., ½-in. nonskid asphaltic concrete on 2½-in. base surfacing Maple, Fourth Sts., et al, to Standard Asphalt Paving Co., Spokane, $31,963.

Wisconsin—State Hy. Comn. and Hy. Comn. Juneau Co., grading, concrete paving 34,877 sq.yd. Kilbourn-Mauston Rd., Juneau Co., to T. G. Arnold, Inc., Eau Claire, $80,084.

Wis., Milwaukee—Dpt. P. Wks., paving South Chase St., to Czerwinski Constr. Co., South 16th St. and West Morgan Ave., $17,797; South Chase St., to White Constr. Co., 110 East Wisconsin St., $26,924.

Ont., Ayr—Waterloo Co. (Kitchener), concrete paving 15,241 sq.yd. Stanley, Bruce and Jedburg Sts., to P. Bergmann, 128 King St. N., Waterloo. Est. $35,000.

Ont., Hamilton—City Council, widening James St., by taking 2½ ft. sidewalk off each side of present sidewalks and paving, $35,000. Day labor under supervision A. McFaul, City Hall, city engr.

Ont., Owen Sound—Grey Co., grading, gravelling 8 mi. hy., Egremont Twp., to D. L. Weber, Kimberly. Est. $25,000.

Ont., Sarnia—W. B. Beatty, city engr., concrete curbing, guttering, sheet asphalt on concrete paving 16,500 sq.yd., to A. Cope & Sons, Albert St., Hamilton. Est. $50,000. Noted June 25.

Ont., Swansea — Etobicoke Twp., asphalt paving 9,500 sq.yd. Runnymede Rd., Kennedy and Morningside Aves., to Constructing & Paving Co. Ltd., Confederation Life Bldg., Toronto. Est. $30,000.

Ont., Toronto—City, R. C. Harris, engr., City Hall, asphalt paving Pine Ave., to Godson Contg. Co., 203 Richmond St. W., $3,327—Tulles Dr., to Rayner Constr. Co. Ltd., 159 Bay St., $10,917—Church St., to McNamara Constr. Co., 53 Yonge St., $31,059—asphaltic concrete paving Yonge St., to Law Constr. Co. Ltd., 225 Sterling Rd., $9,273—2 concrete lanes, to P. Delgreco, 60 Montcalm Ave., $3,451. Grand total $58,027.

Ont., Toronto—City, R. C. Harris, engr., asphaltic concrete and brick block paving Sect. A, Indian Road Crescent, to Constructing & Paving Co. Ltd., Confederation Life Bldg., $2,971—Sect. B, Indian Road Crescent, and concrete paving 1 lane, to L. P. Acri, 28 Grove Ave., $4,250, and $1,525 respectively—asphalt paving Carlton St., to Godson Contg. Co., 203 Richmond St. W., $16,375—Parkmount Ave. and asphaltic concrete paving Richard Ave., to Kilmer & Barber, Harbour Bldg., $2,807 and $6,082 respectively. Grand total $34,010.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

BIDS ASKED

Calif., Los Angeles—Aug. 5, by Los Angeles Harbor Dpt., 405 Branch, City Hall, San Pedro, 2,125 ft. rein.-con. sheet pile mole for Fish harbor extension, incl. dredge fill, 83,400 lin.ft. various sizes and lengths sheet piling.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co. taking bids (A) constructing Gunite slabs at abutments of Sawpit Dam (B) constructing Gunite slabs at east abutment of San Dimas Canal, Proposal 1—(A) 2,350 cu.yd. excav. (B) 4,350 sq.ft. placing Gunite slab; Proposal 2, (A) 745 cu.yd. excav. (B) 1,750 sq.ft. placing Gunite slab.

Calif., Vista—Aug. 4, by W. C. Witman, secy. Vista Irrigation Dist., trenching 46,000 ft. trench at average size 18 x 36 ft., hauling, welding 46,000 ft. Matheson steel pipe ranging from 4- to 8-in. diam. Former bids rejected. Noted July 9.

Ind., Fayette—Aug. 4, by Bd. Comrs. Fayette Co., Connersville, constructing James T. Fisher Drain. $31,216. J. L. Stewart, Connersville, engr.

Mass., Scituate—Aug. 4, by Dpt. P. Wks., State House, Boston, 8 concrete jetties and 600 lin.ft. concrete seawall, in 2 sections, North Scituate Beach; 1,335 lin.ft. concrete sea wall and 26 concrete jetties at Humarock Beach, for Commonwealth of Massachusetts, Boston. A. W. Dean, Dpt. P. Wks., Boston, engr.

Wis., Milwaukee—Aug. 7, by Sewerage Comn., constructing docks, steel sheet piling cut-off wall, temporary effluent channel, filling land in Lake Michigan, for sewage disposal plant, incl. 989 lin.ft. Typ A, 1,100 lin. ft. Type B and 295 lin.ft. Type C block, 280,000 cu.yd. filling, 1,600 lin.ft. sheet piling in cut-off wall, appurtenances, docks incl. steel sheet piling, wood piles, tie rods, concrete cap, wood walls, rails, mooring cleats. $700,000. J. L. Ferebee, 700 74th Ave., engr.

CONTRACTS AWARDED

Louisiana — Bd. State Engineers, 207 New Orleans Court Bldg., New Orleans, constructing 14,000 ft. Lake St. Peter Drainage Diversion, incl. 275,000 cu.yd. excav., Tensas Parish, to J. P. Babcock, Paris, Ill., at $0.0544 per cu.yd. Noted June 18.

Mass., Weymouth—Town Bd. Selectmen, concrete seawall, curbing to J. L. Trainer, Washington St., at $14.90 per cu. yd. Noted July 2.

Okla., Oklahoma City—Comrs. Oklahoma Co., channel change on North Canadian River, near Ash St., incl. 300,000 cu.yd. excav., to L. Sanders, Tradesmens Bldg., $30,000. Noted July 2.

Ont., Port Colborne—N. Desjardins, secy., Dpt. P. Wks., Ottawa, repairing breakwater to Ontario Constr. Co., Bank of Toronto Bldg., St. Catherines, $17,200. Noted June 25.

Ont., Toronto—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging 48,000 cu.yd. silt and sand, Eastern entrance to harbor, to Canadian Dredging Co. Ltd., Midland, $11,520; dredging 286,000 cu.yd. sand, silt, clay and rock of shale foundation, Western entrance to harbor, to C. S. Boone Dredging & Constr. Co. Ltd., 36 Toronto St. $217,640. Noted June 4.

Bond Elections

Coming Bond Elections

Waterworks, Dams and Reservoir—San Diego, Calif., Aug. 11, $835,000. H. N. Savage, City Hall, engr.

Flood Control — San Francisco, Calif., Amer. River Flood Control Dist., Sept. 15, $6000,000.

Court House—Monticello, Ark., Drew County, $150,000.

Bonds Voted

Waterworks and Distribution System—Waynesville, Mo., $21,000.

Bonds Defeated

Waterworks System—Allerton, Iowa, $11,500.

Sewage Disposal Plant — Cambridge, Md., $350,000.

Flood Control—El Paso County, Tex., $325,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Mass., Cambridge — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office, $755,000.

Mass., Salem—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches by Smith & Walker, 80 Boylston St., Boston, 1 story, basement, brick, stone U. S. Post Office, Margin and Norman Sts. $250,000. Noted Apr. 23.

Oregon—CANAL—Bureau Reclamation, Denver, Colo., soon takes bids Mitchell Butte Canal, 10 mi. long, 4 tunnels, 4 steel pipes, syphons, flume section, on Owyhee Irrigation Project, Macheur Co. $1,500,000.

BIDS ASKED

Ark., Brinkley—POST OFFICE—Aug. 10, by Treas. Dpt. at office Sup. archt., U. S. Post Office, $65,000. J. A. Wetmore, c/o owner, acting supervs. archt. Noted May 14.

D. C., Wash.—LIGHTING SYSTEM—Aug. 20, at office Archt. Capitol, installing street and park lighting system as part of enlargement of Capitol Grounds; adv. E.N.-R. July 30.

D. C., Wash.—SPRINKLING SYSTEM—Aug. 19, at the office D. Lynn, archt. of Capitol, furnishing and installing underground lawn sprinkling system in part of U. S. Capitol Grounds, east of Capitol Building; adv. E.N.-R. July 30.

Fla., Jacksonville—PIPE—Aug. 7, by U. S. Eng., P. O. Box 45, Jacksonville, lap welded pipe for dredge Congaree.

Ky., Louisville—DREDGING—Aug. 14, by U. S. Eng., P. O. Box 72, removing 14,500 cu.yd. rock and 1,000 cu.yd. mud deposit from lower approach to auxiliary lock at Dam 41, Ohio River; adv. E.N.-R. July 30. Noted July 23.

Mississippi, Arkansas and Louisiana—DREDGING—Aug. 18, by U. S. Eng., P. O. Box 667, Vicksburg, Miss., 19,081,700 cu.yd. earthwork on east and west banks Mississippi River, and 140,000 cu.yd. earthwork on south bank Arkansas River; adv. E.N.-R. July 30.

N. H., Portsmouth—GENERATOR—Aug. 5, by Bu. Yards & Docks, Navy Dpt., turbo generator.

New Jersey—DREDGING—Aug. 13, by U. S. Eng., 39 Whitehall St., New York, dredging 53,-000 cu.yd. overlying material and 34,700 cu.yd. ledge rock, in Raritan River; adv. E.N.-R. July 30.

N. J., Trenton—POST OFFICE—Aug. 21, by Treas. Dpt. at office Sup. Archt., constructing (except elevators and foundations) U. S. Post Office and court house; adv. E.N.-R. July 30.

N. Y., Trout River—INSPECTION STATION—Aug. 25, by Treas. Dpt. at office Sup. Archt., constructing U. S. Inspection Shed; adv. E.N.-R. July 30.

O., Cleveland—HOSPITAL—Aug. 3, by Treas. Dpt. at office Sup. Archt., landscaping, approach work at U. S. Marine Hospital; adv. E.N.-R. July 30.

O., Millarsburg—POST OFFICE—Aug. 19, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. July 30.

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Federal Government Work (Continued)

Pa., Carlisle Barracks—SEWAGE SYSTEM—Aug. 11, at office Con. Q.M., sewage disposal system; adv. E.N.-R. July 30.

Tex., Randolph Field—TANKS—Aug. 3, at office Sup. Archt., constructing 4 auxiliary concrete water storage tanks and 1 underground covered concrete reservoir; adv. E.N.-R. July 30.

Tex., Randolph Field—FUELING SYSTEM—Aug. 19, at office Con. Q.M., installing gasoline fueling system; adv. E.N.-R. July 30.

Canal Zone—QUARTERS, etc.—Sept. 21, at office Dpt. Quartermaster, P. C. Dpt., Quarry Heights, 2 field officers quarters; 5 company officers quarters; 2 N.C.O. quarters; 1 barracks at Fort Davis; adv. E.N.-R. July 30.

CONTRACTS AWARDED

Ala., Mobile—DREDGING—U. S. Eng., dredging 28.5 mi. in Mobile Bay Channel, by own forces. $175,745. Noted June 4.

Arkansas—DITCH—Bureau Biological Survey, Dpt. Agriculture, 29,000 cu.yd. drainage ditch at Big Lake Bird Reservation, to Vollmer & Son, Inc., Blytheville, at $0.22 per cu.yd.

Illinois—EARTHWORK—U. S. Eng., 1005 McCall Bldg., Memphis, Tenn., 115,000 cu.yd. earthwork in Cario Drainage Dist., to A. Guthrie & Co., Inc., 1300 Builders Exch., St. Paul, Minn., $55,200.

Louisiana—LEVEES—U. S. Eng., Prytania and River Sts., New Orleans, 4,280,000 cu.yd. earthwork in Cottage-Kempe Levee Dist., Lower Tensas Levee Dist., to Trinityfarm Constr. Co., Santa Fe Bldg., Dallas, Tex., at $0.1645 per cu.yd.; 420,000 cu.yd. Poplar Grove Levee, Atchafalaya Front Levee Dist., to Canal Constr. Co., McCall Bldg., Memphis, Tenn., $49,686; 740,000 cu.yd. Morrison-Picayuneville Levee Enlargement and Riverside turnover and 500,000 cu.yd. in New Homestead Levee, Atchafalaya Front Levee Dist., to Grasser Constr. Co., Amer. Bank Bldg., New Orleans, $71,262 and $48,150 respectively.

Mass., Boston—GRANITE—Treas. Dpt. at office Sup. Archt., white granite for U. S. Post Office to H. E. Fletcher Co., West Chelmsford, est. $500,000. Noted Apr. 2.

N. M., Albuquerque—ELEVATORS—Vet. Bu., Arlington Bldg., elevators for U. S. Post Office, to Kimball Bros., Council Bluffs, Ia., $18,837; zeolite water softening plant, to Graver Tank & Mfg. Co., East Chicago, Ind., $8,084; steel water tank and tower, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $7,990. Grand total $34,911. Noted June 18.

Texas—DREDGING—U. S. Eng., Galveston, 250,000 cu.yd. Cedar Bayou Channel, to Gulf Coast Dredging Co., 2311½ Avenue C, Galveston, $29,295. Est. $30,000. Noted June 18.

Tex., El Paso—LIGHTING AIRWAY—Dpt. Commerce, lighting airway from Phoenix to El Paso and Phoenix to San Diego, to Airports Eng. & Constr. Corp., Dallas, $82,202.

Tex., Randolph Field—PAVING—Con. Q. M., 6 in. concrete paving streets, to H. B. Zachry, Laredo, $178,060. Noted July 16.

Va., Manassas—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to A. Blair, 1st Natl. Bank Bldg., Montgomery, Ala., $42,500. Noted June 25.

Va., West Point—POST OFFICE—Treas. Dpt., at office Sup. Archt., U. S. Post Office to A. Blair, 1st Natl. Bank Bldg., Montgomery, Ala., $60,000. Noted June 25.

Washington—ROAD—Pub. Rds., Portland, Ore., grading 1.168 mi. Stevens Canyon Hy., 18 ft., Prairie Co., to Holmberg & Norman, Port Orchard, $155,665.

RAILWAYS

CONTRACTS AWARDED

Michigan—Dpt. Street Railways, St. Jean and Shoemaker Aves., Detroit, relocating street railway tracks in connection with widening street and pavement between rails and tracks, in Detroit, construction work by Department's own forces; furnishing minimum of 2,500 cu.yd. 1-2-4 ready mixed concrete, to J. K. Wing Co., 4066 Kendall Ave., at $4.75 per cu.yd. Est. $50,000.

Pennsylvania and Maryland — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Station, Phila., Pa., concrete catenary foundations for electrification main line from Berryville, Pa., to Baltimore, Md., incl. 16,000 yd. excav., reinforcing steel, etc., to J. F. Casey Co., Aspinwall, Pa., $500,000.

SUBWAYS AND TUNNELS

CONTRACTS AWARDED

Mass., Boston — Transit Dpt., constructing Sect. B, traffic tunnel between Boston and East Boston, to C. & R. Constr. Co., 75 Bradeen St., Roslindale, $259,525. Noted June 25.

GRADE CROSSINGS

PROPOSED WORK

N. J., Wayne — Township Com., Township Hall, grade crossing on Boonton Rd. and Erie R.R. tracks. $25,000 or more. **Maturity probably soon.**

O., Cleveland—Cleveland, Cincinnati, Chicago & St. Louis R.R., H. Baldwin, Cincinnati, ch. engr., and Bd. Comrs. Cuyahoga Co., preliminary plans rein.-con. grade crossing elimination, Settlement Rd. $400,000. J. B. Hunley, 2306

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East 9th St., Cleveland, c/o Railroad, engr. bridges and structures and A. M. Felgate, Court House, county engr.

BIDS ASKED

D. C., Wash.—Aug. 25, by District Commissioners, District Bldg., tracks and right of way for Baltimore and Ohio Railroad Co., in line Piney Branch Rd.; adv. E.N.-R. July 30.

CONTRACTS AWARDED

N. Y., New York—New York Central R.R., 466 Lexington Ave., constructing underpass to join Bronx River Parkway and Bronx Blvd., Woodlawn, to Arthur McMullen Co., Inc., 50 Church St. $154,000.

Wisconsin—State Hy. Comn. and Unemployment Comn., Madison, constructing Oshkosh Overhead Crossing, State Aid Project 3118, S.T.H.26, Winnebago Co., to Appleton Constr. Co., Appleton, $15,267; Siding 190 Overhead Crossing, State Aid Project 3242, S.T.H.26, Winnebago Co., to C. R. Meyer & Sons Co., Oshkosh, $10,282.

DAMS

PROPOSED WORK

Calif., San Diego—See "Waterworks."

PIERS AND WHARVES

PROPOSED WORK

Tex., Beaumont—Port Comn. c/o Manager, postponed taking bids wharf and dock improvements. $100,000. Noted July 3 Daily.

BIDS ASKED

Calif., San Francisco—Aug. 6, by State Board of Harbor Comrs., Ferry Bldg., 400 x 15 ft. rein.-con. wharf, also precast and rein.-con. retaining wall, Jefferson St. near Taylor St. F. G. White, Ferry Bldg., engr.

AIRPORTS

PROPOSED WORK

La., New Orleans—Orleans Levee Bd., Camp and Common St., A. L. Shushan, pres., plans Shushan Airport, 2,600 x 4,500 ft. on 240 acre site, surrounded by concrete seawall, incl. 4,000,000 cu.yd. sand and shell to fill in lake, four 3,000 ft. runways, 60 landings and takeoffs handled daily. Preliminary surveys and aerial photographic work completed, construction 2 mi. concrete bulk-heads now under way. Initial development $1,500,000. Total expenditure $10,000,000. National Airport Eng. Co. Ltd.,775 East Washington St., Los Angeles, Calif., Omaha, Neb. and Cleveland, O., engrs. Noted Dec. 18.

Mass., Lee— Town, W. Smith, Bd. Selectmen, seeking funds for new airport. $50,000. E. D. I. L.

Mo., Bridgeton—City of St. Louis, c/o Bd. P. Serv., 208 City Hall, St. Louis, soon takes bids 1 and 2 story, basement, brick, steel, rein.-con. airport terminal, Lambert-St. Louis Flying Field. $152,000. A. Osburg, City Hall, St. Louis, archt. L. R. Bowen, City Hall, St. Louis, engr. Noted June 18.

CONTRACTS AWARDED

N. J., Newark—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract 1 story, basement, 110 x 160 ft., brick, steel, airplane hangars Newark Airport to Perth Amboy Constr. Co., 61 Madison Ave., Perth Amboy, $50,993; heating to N. F. Cantello, 23 Christine St., Elizabeth, $7,085; electrical work to Badaracco Bros. & Co., 403 Washington St., Hoboken, $2,800. Grand total $60,878. Noted June 11.

GRAIN ELEVATORS

PROPOSED WORK

Tex., Fort Worth—City, c/o G. Fairtrace, mgr., and International Great Northern R.R. Co., C. S. Kirkpatrick, ch. engr., Houston, underpass to have plate girders, two 30 ft. roadway openings, 42 degree skew, two 6 ft. sidewalks under railroad tracks on East Rosedale extension. $30,000.

CONTRACTS AWARDED

Ia., Sioux City — Great Northern R.R. Co., St. Paul, Minn., J. R. W. Davis, ch. engr., c/o J. P. Donohue, 516 Nebraska St., 250,000 bu. rein.-con. addition to grain elevator, incl. 17 storage bins, to Burrell Eng. & Constr. Co., 1 North Canal St., Chicago, Ill. Foundation contract previously awarded to Pepper & Fulton Co., Sioux City. Flanley Grain Co., J. E. Cathcart, treasurer, 509 Warnock Bldg., lessee. Est. $65,000. Noted Mar. 5.

Mass., Groton—Boston & Maine R.R. Co., W. J. Backes, ch. engr., Boston, concrete, steel overhead bridge, to Eng. Serv. & Constr. Co., 161 Devonshire St., Boston. Est. $25,000 or more. Noted July 23.

POWER AND LIGHTING

PROPOSED WORK

Okla., Shidler—City granted gas and electric light franchise to Oklahoma Power & Water Co., Sand Springs. $40,000. S. E. Wolff, Sand Springs, engr.

BIDS ASKED

N. J., Secaucus—Aug. 13, by Bd. Freeholders Hudson Co., Court House, Jersey City, auxiliary steam line, incl. pipe line work, excavation, concrete work between power house and Contagious Diseases Hospital, at Laurel Hill. $25,000. F. J. Radigan, Jersey City, co. engr.

Alta., Edmonton—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Monrovia—See "Streets and Roads."

Alta., Edmonton—Edmonton Electric Light Dpt., plans putting all overhead wires underground. Day labor under supervision W. Barnhouse, supt. $50,000.

PARKS AND SPORTS

PROPOSED WORK

Ia., Burlington—Kiwanis Club, C. H. Walsh, chn., preliminary plans swimming pool. $25,000.

Mass., Attleboro—City, S. H. Foley, City Hall, 1 story, brick, timber animal house, Capron Park. $25,000-$30,000. Higgins & Johnston, 24 Park St., archts.

Neb., Lincoln—University of Nebraska, c/o Board of Regents, plans 35 x 75 ft. swimming pool in University Coliseum. $35,000.

N. J., Belmar—Bd. Boro Council, Boro Hall, concrete stadium, at Memorial Field. $25,000. Project abandoned. C. W. Birdsall, boro engr. Noted July 2.

N. J., Jersey City—International Stadium Co., C. Farrai, pres., revised plans rein-con. stadium, on plot between State Hy., Bway., Dales and Logan Aves. $2,500,000. F. W. Melbor, 25 West 45th St., New York, engr. Noted Mar. 5.

N. Y., New York—Bway. Temple Building Co., 50 Church St., revised plans by Shreve Lamb & Harmon, 11 East 44th St., gymnasium, locker rooms, 4101 Bway. $60,000. Noted Jan. 30.

N. Y., Port Richmond—J. A. Lynch, pres. Richmond Boro, Boro Hall, bids late in fall, general contract 1 story, basement, brick, steel outdoor baths, Faber Park. $300,000. Sibley & Fetherston, 205 East 42nd St., New York, archts. Noted May 14.

Tex., Beaumont—South Texas State Fair Assn., c/o B. D. Jackson, plans State Fair Improvements, incl. rein.-con. sidewalks, paving streets within enclosure, storm sewers, drainage system, etc. $100,000. Address R. C. Black, Beaumont, city engr.

BIDS ASKED

Me., Windham—Town, F. Aikens, taking new bids brick, timber, auditorium and gymnasium, plain found. Est. exceeds $25,000. S. C. Robinson, Westbrook, archt.

N. Y., Ithaca—Aug. 18, by Finger Lakes State Park Comn., 109 North Tioga St., park pavilion, Cayuga Lake State Park, Seneca Co.; adv. E. N.-R. July 30.

Utah, Salt Lake City — See "Contracts Awarded."

N. Y., Long Island City—Aug. 4, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, erecting and completing field house, Rainey Park, Queens Boro.

N. Y., New York—Aug. 4, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, constructing walks, curbing, retaining wall, along westerly side Boston Rd., Bronx Park South and Bronx Park East.

CONTRACTS AWARDED

Conn., Litchfield—Town, School Dpt., brick gymnasium for Springfield School, to Torrington Building Co., Church St., Torrington. Est. $30,000.

Conn., Windsor—Loomis Institute, N. H., Bachelder, head master, athletic field, incl. 11,000 cu.yd. fill and drainage system, baseball, football track, etc., ameisite surfacing and sidewalks, to E. M. Brown, 15 Lewis St., Hartford. Est. exceeds $25,000. Noted Mar. 19.

Mass., Boston—Park Dpt., 33 Beacon St., 1 story, brick, concrete field house at Mary Hemenway Playground, Dorchester, to J. B. Dolan, 43 Tremont St., $22,000. Est. $25,000. Noted May 26.

N. J., Morristown—J. W. O'Connor, archt., 162 East 37th St., New York, 2 story, 60 x 160 ft. stucco, steel enclosed tennis courts, incl. oil burning heating, to Bontempo & D'Annunzio, Inc., 39 Washington St., for J. H. Frelinghuysen, Normandie Heights. Est. $25,000. Noted July 2.

N. J., Princeton—Bd. Educ., athletic field, to James F. Molloy, Inc., 15 East Mermaid Lane, Phila., Pa. $25,000. Noted July 2.

N. J., Trenton—International Automobile Speedway, Inc., 50 Broad St., New York, general contract 3 mi. bowl, for motor speedway, near Clarksville. **Maturity in November.** $2,600,000. Noted Dec. 25.

Utah, Salt Lake City—State Fish & Game Dpt., Capitol, N. B. Cook, comr., dykes, ponds, public shooting grounds, at Locomotive Springs in Boxelder Co., owner will build 1st unit of dykes, by day labor, $30,000. Total $80,000.

HEATING AND VENTILATING

PROPOSED WORK

N. Y., New York—J. Rothstein, 1133 Bway., altering boiler room and plumbing for store, apartment, 159 East 60th St. $40,000. A. J. Simberg, 1133 Bway., archt. Project in abeyance until winter. Noted May 28.

BIDS ASKED

Ind., Angola—Conservation Dpt., Indianapolis, taking bids brick, stone, vapor, steam heating plant, plumbing, electrical work, State Park Inn, Pokagon State Park, near here. $25,000. Bishop-Knowlton & Carson, 312 North Meridian St., Indianapolis, engrs.

N. Y., Oswego—Aug. 6, by State Dpt. Educ., Education Bldg., Albany, heating work, new boilers, New York State Normal School. Noted July 13.

Heating and Ventilaitng (Continued)

CONTRACTS AWARDED

N. J., Jersey City—Bd. Educ., 30 Journal Sq., furnishing, installing heating and ventilating work in Dickinson High School, to F. P. Farrel, 269 Camden St., Newark, $105,198. Noted May 7, under "Schools."

N. Y., New York—G. and K. Realty Corp., Chrysler Bldg., altering, heating, plumbing work in remodeled sanitarium, to W. G. Clark, 15 West 44th St. Est. $75,000. Noted July 9.

N. Y., Willard—Dpt. Mental Hygiene, State Office Bldg., Albany, heating and heating system Willard Hospital, to Gold Seal Heating & Plumbing Co., Rochester, $135,000; electrical work and service lines, to R. H. Carter, 76 Seneca St., Hornell, $4,450.

UNCLASSIFIED

PROPOSED WORK

N. J., Hackensack—ELEVATORS—Aug. 3, by Bd. Freeholders Bergen Co., Court House, elevators, electrical work, at administration building, Main and Hudson Sts. Noted May 28, under "Public."

N. Y., Albany—TRANSIT SHED—Aug. 6, at office Albany Port District Comn., 74 Chapel St., constructing 2 story, 120 x 400 ft. transit shed. Contr. 51. A. G. Arnold, ch. engr.; adv. E.N.-R. July 30.

N. Y., Comstock—ROOFING—Aug. 4, by Commissioner Dpt. Correction, State Office Bldg., Albany, roofing and sheet metal work for storehouse, Great Meadow Prison; adv. E.N.-R. July 30.

N. Y., New York—BORINGS—Aug. 4, by Bd. Transportation, J. H. Delaney, ch., 250 Hudson St., addition borings along Route 101, 6th Ave., 9th to 33rd Sts., Manhattan Boro.

N. Y., New York—ELEVATOR, etc.—J. B. Snook, archt., 52 Vesey St., taking bids general contract altering elevator, loft and salesroom, 1631 Bway., for E. E. Wendel Estate, 175 Bway. $40,000. Noted July 9.

CONTRACTS AWARDED

Illinois — PIPE LINE — Panhandle Eastern Pipe Line Co., Dwight Bldg., Kansas City, Mo., auxiliary pipe lines connecting Jacksonville, Decatur, Champaign and Danville with main pipe line from natural gas fields of Texas, to Oklahoma, Kansas, Illinois, and Indiana, to Sheehan Pipe Line Constr. Co., Exchange Natl. Bank Bldg., Tulsa, Okla.

Md., Baltimore — PREMIXED CONCRETE PLANT—Arundel-Brooks Concrete Co., Pier 2, Pratt St., steel, concrete bins, conveyor, Wolfe and Fell Sts. $50,000. Owner builds. Private plans.

Mass., Boston—COAL POCKET—Burton-Furber Coal Co., 10 High St., concrete pocket and timber trestle, installing conveyor equipment, to Nicholson Co., Chrysler Bldg., New York, $19,500 est. $25,000.

N. Y., New York—ELEVATOR—Corporation, c/o Mayer Rapport, 295 Madison Ave., elevators, plumbing for apartment, to Goldberg Contr. Co., 338 West 56th St. Est. $40,000. Noted Apr. 16.

Pa., Pittsburgh — LAND DEVELOPMENT — Buhl Foundation, Farmers Bank Bldg., land development, incl. 40,000 cu.yd. grading, 2,500 lin.ft. 19 in. and smaller sewers, 3,000 ft. 6 in. water line, to McCardy Constr. Co., Investment Bldg., Est. $1,000,000.

Texas—PIPE LINE—Lucey Petroleum Co., c/o J. F. Lucey, Longview, constructing 4¼ mi. 6 in. c.i. bell joint pipe line and 5 stage pump station, near Longview, to Gregg Constr. Co. Inc., c/o H. W. Turner, vice pres., Longview, $35,000.

MATERIALS

BIDS ASKED

BRIDGE PLANK, PILING, etc.—**Fairfield, Ia.**—Aug. 3, at office Auditor Jefferson Co., 209,800 M.B.M. full saw-fir-rough bridge plank; 95,667 M.B.M. full saw-rough-pressure treated creosoted bridge plank; 3,700 lin.ft. pressure treated creosoted piling. Address Co. Engineer or Auditor.

LUMBER—**New York, N. Y.**—Aug. 7, by P. J. Dooling, comr. Purchase, Municipal Bldg., lumber and piles to Dpt. Park and Structures.

CONCRETE and PAVING SAND—**West New Brighton, N. Y.**—Aug. 5, by J. A. Lynch, pres. Richmond Boro, Boro Hall, St. George, 600 cu.yd. concrete paving sand to Bu. Hys., Richmond Terrace St., near Taylor St.

STRUCTURAL STEEL—**Phila., Pa.**—Aug. 4, by C. E. Walsh, purchasing agt., for Pennsylvania R.R. Co., 15 North 32nd St., structural steel. Cont. 19.

CAST IRON PIPE, etc.—**Roaring Springs, Pa.**—Aug. 3, by J. R. Rassler, secy. 3,640 lin.ft. Class B c.i. pipe, conforming with American Water Works specifications, 8 x 6 in. c.i.T branch, 8 in. shut off valve, 8 x 4 in. c.i.Y branch, 3,600 lb. pig lead.

CAST IRON PIPE, CASTINGS, etc.—**Ottawa, Ont.**—Aug. 11, by Secretary Bd. Control, furnishing c.i. pipe and special castings, gate valves, check valves, sluice gate, automatic valves, venturi meters, water level controller, pneumatic conveying equipment, alum and lime dry feed machines and equipment, and for supply and installation of chlorine feed equipment. W. E. MacDonald, engr.

CONTRACTS AWARDED

CAST IRON PIPE—**Riverside, Calif.**—City Council, furnishing 10,000 lin.ft. Class 150, 6 in. c. i. pipe f.o.b. trenchside, to Pacific States Cast Iron Pipe Co., Subway Terminal Bldg., Los Angeles, at $0.545 per ft.

WATER PIPE, etc.—**Marblehead, Mass.**—Town, Water Dpt., furnishing water pipe and special castings as required to Warren Pipe & Foundry Co., 75 Federal St., Boston, at $35.70 per ton.

INORGANIC DUST, etc.—**New York, N. Y.**—S. Levy, pres. Manhattan Boro Municipal Bldg., 4,000 tons inorganic dust and 10,000 cu.yd. binder stone, to New York Trap Rock Corp., 101 Park Ave., $24,560 and $18,400 respectively; 800,000 gal. asphaltic cement, to Warner Quinlan Co., 79 Wall St., $25,760. Grand total $68,720. Noted July 2.

ASPHALTIC ROAD OIL—**Hasbrouck Heights, N. J.**—Bd. City Council, Municipal Bldg., 100,000 gal. road oil for street repairs, to Lansdell Co., 173 Main St., Hackensack, at $0.12 per gal. Noted June 29 Daily.

EQUIPMENT

PROPOSED WORK

ASH HOISTS, FANS, MOTORS, etc. — **Winston-Salem, N. C.**—D. N. Corporation wants catalogues, samples, price lists, etc., from manufacturers on ash hoists, fans, blowers, electric motors, cranes, air preheaters, steel sash, steel doors, hinged, sliding and rolling, cementile roofing, roof ventilators, plumbing, steel stairs, firebrick, etc. R. S. Webb, ch. engr.

SCRAPERS, HEAVY TRUCKS, etc.—**Colorado** — Colorado Hy. Dpt., Denver, in market for equipment, incl. scrapers, heavy trucks to pull them. $175,000. C. D. Vail, hy. engr.

COAL and ASH HANDLING EQUIPMENT, etc.—**Wyandotte, Mich.**—Aug. 3, by Frochlick & Emery, engrs., 2nd National Bank Bldg., Toledo, O., furnishing, installing coal and ash handling equipment for new power house to incl. elevators, conveyors, motors, vinewood Ave. and Van Alstyne Blvd., for City. Noted Sept. 25, under "Power Plants."

TRUCK—**Great Falls, Mont.**—Cascade Co., H. B. Lockhart, co. surveyor, in market for one 2-ton, one 1½-ton trucks, 1 oil distributing machine, 1 elevating grader, etc.

VALVE-GRINDING MACHINE — **Great Falls, Mont.**—Bd. Comrs., Cascade Co., H. B. Lockhart, co. surveyor, in market for one valve-grinding machine, 1 emery wheel and stand, 1 motor connecting-rod aligner.

DITCH DIGGING MACHINERY—**San Juan, Porto Rico**—J. Odilo Vega & Co., Box 1474, San Juan, ditch digging machinery, to dig 12-in. wide and 18-in. deep ditches.

FOREIGN

England, London—County Council approved plan for road bridge over Thames River, at Charing Cross. $62,500,000.

Italy, Rome—D. C. Wilcox, vice consul, Rome, plans 35 mi. subways, rebuilding present railway, and constructing 2 railway stations. $22,000,000.

Netherlands—P. S. Guinn, assistant Commercial Attache, The Hague, reports government awarded contract road 1 to C. Lagerwrij, Vlissingen, $156,897; widening and improving road from Oldelaansterbrig to border of municipality of Ooststellingwerf, to N. V. Nederlandsche Basalt Maatschappij Zaandam, $116,184; riding track on government road Valkenswaard-Belgian Border to Geruischloozie Weg, Heemstede, $101,700—constructing Spijkenisse-Brielle Rd., to J. C. Beenen & Co., Duivendrecht, $158,062.

South Africa, Johannesburg—Metro-Goldwyn-Mayer Corp., 630 9th Ave., New York, plans by T. W. Lamb, 570 7th Ave., New York, theatre, Weinberger & Weisoff, 570 Lexington Ave., New York, structural engrs., and A. Jordan Bernstein, 1350 Bway., New York, consult. engr.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

N. Y., Brooklyn—Shore Road Associates, taking separate contract bids, apartment, Shore Rd., 87th to 88th Sts. $1,000,000. Tobatchnick U. Book, 32 Court St., archts.

N. Y., New York—See "Contracts Awarded."

N. J., Atlantic City—Graham Hotel Corp., 12 story, basement, 60 x 70 ft., brick, steel, rein.-con., 103 State Ave., to A. W. Funk Co., Commercial Trust Bldg., Phila., Pa.

N. Y., New York—Kindbell Realty Corp., S. Belkin, pres., 1067 Washington Ave., apartment, Morris Ave. and 196th St. $150,000. Separate contracts. H. I. Feldman, 15 West 44th St., Archt.

CLUBS

PROPOSED WORK

N. Y., New York—Cosmopolitan Club, 133 East 40th St., plans by T. H. Ellett, 101 Park Ave., 10 story club, 122 East 66th St., $275,000.

HOSPITALS

BIDS ASKED

Calif., Los Angeles—H. L. Gilman, archt., Kerckhoff Bldg., taking bids 2 story, 63 x 170 ft., rein.-con. hospital addition, St. Louis St. for Santa Fe Coast Lines Hospital Assn. $150,000. Noted May 14.

Calif., San Francisco—Aug. 12, by S. J. Hester, sec. Bd. P. Wks., granite work for health center building, Civic Center, for City and San Francisco Co. $125,000. Noted Aug. 21.

Calif., San Francisco—Aug. 12, by S. J. Hester, secy. Bd. P. Wks., City Hall, brick work, tile partitions, furnishing, setting ferra cotta cornice, health center building Civic Center. $80,000. Total est. $850,000.

N. Y., Pine Aire Station—Aug. 26 (extended date) by Dpt. Mental Hygiene, State Office Bldg., Albany, constructing 17 buildings, railroad shelter, service tunnels, salvage yard wall, altering and additions to Buildings 35 and 37, Pilgrim State Hospital; adv. E.N.-R. July 30.

N. Y., Wingdale—Aug. 19, by Dpt. Mental Hygiene, State Office Bldg., Albany, constructing Buildings 18, 19, 20, 21, 22, 29, 30, 31, 32, 33 and 34, accommodations for tubercular patients (additions), service tunnels, and moving storehouse at Harlem Valley State Hospital; adv. E.N.-R. July 30.

Vt., Waterbury—State Hospital for Insane, taking bids heating, plumbing, electrical work in Female Ward. $25,000. F. L. Austin, 240 College St., Burlington, archt.

CONTRACTS AWARDED

Mass., Adams—Plunkett Memorial Hospital, A. B. Daniels, pres. Bd. Trustees, 2½ story, 40x75 ft., 35x80 ft., brick, granite maternity unit and nurses' home, to H. P. Cummings Constr. Co., 14 Prospect St., Ware. Est. $150,000. Noted June 11.

Miss., Jackson—Bd. Comrs. Insane Hospitals-Comn., c/o State Hospital Removal & Land Sale Comn., to Lockard & Vaughn, Meriden, Attendants Cottage 2, $29,000; to W. C. Salley, Monroe, Infirmary Building 1, $49,889. Attendants Cottage 1 $32,292; to B. Pinch, Birmingham, Ala., electric power distribution $5,856; to O. Williams, Jackson, electric wiring $8,566. Grand total $125,603.

N. Y., Staten Island—Dpt. Hospitals, Municipal Bldg., general contract male pavilions, A, B, C and D, at New York City Farm Colony, to Longacre Eng. Co., 345 Madison Ave., $506,500; plumbing, to S. Ninskoff, $70,430; electrical work, to Lord Electric Co., 105 West 40th St., $15,750. Grand total $592,680. Noted June 18.

Wis., Milwaukee—Eschweiler & Eschweiler, archts., 210 Mason Bldg., general contract 4 story, 48 x 100 ft., brick, rein.-con. hospital, North Maryland Ave., to Riesen Building Co., 2218 North 3rd St., for Columbia Hospital. Noted June 18.

CHURCHES

PROPOSED WORK

Md., Centreville—Shreve, Lamb & Harmon, archts., 11 East 44th St., New York, soon lets contract 1 story, basement, 67 x 95 ft., brick, stone, rubble stone, church and rectory, for Mother of Sorrows Roman Catholic Church. $200,000.

N. Y., New York—Church of St. Roch, Wales Ave. near 149th St., bids in August, general contract church, rectory, Wales Ave. and 149th St. To exceed $15,000. DePace & Juster, 151 West 46th St., archts. Noted June 25.

BIDS ASKED

Mass., Belchertown—Aug. 11, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, 3 units brick, steel, industrial school, school and gymnasium and nursery. Est. exceeds $150,000. Kendall Taylor & Co., 209 Columbus Ave., Boston, archts. R. B. Kimball Co., 6 Beacon St., Boston, engr. Noted July 9.

N. J., East Orange—W. B. Bower, archt., 437 Main St., taking bids general and separate contracts altering and 2 story, basement addition, Harrison St., for Trinity Congregational Church, 26 Harrison St. $150,000.

CONTRACTS AWARDED

Conn., Newington—St. Mary's Mission Roman Catholic Parish, J. Timmons, pastor, 1 story, brick, stone church, to J. H. Clark, 88 Canterbury St., Hartford. Est. $150,000. Noted June 11.

Mass., Jamaica Plain—City of Boston, Dpt. Schools Building, soon takes bids 2 story, basement, brick, stone intermediate school, plain found., Francis Parkman Dist. Est. $150,000. J. F. Cullen, 162 Newbury St., Boston, archt. Noted June 25.

N. J., Elizabeth—L. Quien, Jr., archt., 229 Broad St., general contract 1 story, basement, brick, steel church, to August Hempel, 888 Edgar Rd., Linden, for Swedish Lutheran Church, D. Jacobsen, 223 Rahway Ave. Est. $150,000. Noted June 18.

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Churches (Continued)

N. J., Jersey City—Church of Our Lady of Sorrows. E. Monteleone, pastor, 75 Claremont Ave., general contract 2 story, basement, brick, steel convent, to F. Roxas, 341 East Central Blvd., Palisades Park. Est. $150,000.

N. J., Newark—Franklin Memorial Church, J. Ether, pastor, general contract 2 story, basement, brick, steel, to J. B. Roberts & Co., 949 Bway., New York. Est. $150,000. Contractor now taking bids on materials and separate contracts. Noted July 9.

Ont., Ottawa—St. Joseph's Church, Wilkrod and Cumberland Sts., general contract 1 story, basement, stone, brick, to Doran Constr. Co. Ltd., 67 Queen St.; plumbing, heating, ventilating, to W. G. Edge, 150 Gloucester St. Est. $250,000. Noted Jan. 22.

Ont., Sault Ste. Marie—T. Eaton Co. Ltd., 190 Yonge St., Toronto, general contract 2 story, basement, brick, concrete, department store, to Dickie Constr. Co. Ltd., 17 Yorkville Ave., Toronto; electrical work, to Ontario Electric Constr. Co., 66 Temperance St., Toronto. Est. $250,000. Noted Apr. 30.

Ont., Toronto—H. J. Chown, archt., 20 Wayland Ave., 1 story, basement, with 100 ft. high tower, 65 x 120 ft., stone, church, to James A. Wickett Ltd., 16 Saulter St. Est. $150,000. Noted June 4.

SCHOOLS

PROPOSED WORK

Ind., South Bend—Notre Dame University sketches by M. B. Carroll, 713 Linwood St., Kansas City, Mo., Knute Rockne Memorial Fieldhouse, on campus. $1,000,000. This corrects report in June 26 issue.

BIDS ASKED

Fla., Tallahassee—Aug. 10 by State Bd. Control, P. K. Yonge, chn., training school building at Florida A. & M. College for Negroes. R. Weaver, 204 Peabody Hall, Gainesville, archt.

Ill., Peoria—Bd. of School Inspectors, G. T. Mowart, secy., 300 North Monroe St., bids about Sept. 1 (extended date) Junior High School, 2 and 3 story, basement, 250 x 450 ft., rein.-con. brick, plain found., incl. shops, science and music halls, art rooms gymnasium, cafeteria. $800,00. Hewitt, Emerson & Gregg, Peoria Life Bldg., archts. and engrs. Noted May 21.

Ia., Charles City—Bd. Educ., E. Lawson, secy., probably takes bids about Sept. 1, concrete, brick, stone high school. $250,000. Jacobson & Jacobson, 123 Grand St., Minneapolis, Minn., archts. Noted May 21.

Mass., Jamaica Plain—Aug. 6, by City of Boston, Dpt. School Buildings, altering and constructing 2 story, basement addition to Edwin P. Seaver School, Elldrige Rd. $160,000. J. F. 162 Newbury St., Boston, archt. Noted July 16, under "Boston."

Mass., Waltham—City, School Bd., taking bids 2 story, basement, brick, stone, school, plain found., Appleton Park. $150,000 or more. Fay, Spofford & Thorndike, 44 School St., Boston, archts. Noted May 28.

N. J., Englewood—Aug. 17, by Bd. Educ., 11 Engle St., Grade and Junior High School, 2 story, basement; brick, steel, rein.-con., Knickerbocker Rd. $850,000. L. C. Licht, 4 Dean St., archt. Noted July 16.

N. J., Newark—H. J. Weiler, archt., 40 Konarn St., bids about Aug. 15, general contract parochial school addition, Oliver St., for Owner, c/o architect. $150,000. Noted July 16.

N. Y., Oneonta—Aug. 20, by Commissioner Dpt. Educ., Education Bldg., Albany, general contract practice school at New York State Normal School; adv. E. N.-R. July 30.

N. Y., St. George—Aug. 4, by W.-C. Martin, archt., Flatbush Ave. extension and Concord St., Brooklyn, general contract Staten Island Vocational and Continuation School, Wall St., St. Marks Pl. to Belmont Pl., for Bd. Educ., 500 Park Ave., New York. Noted Oct. 23.

Pa., Arnold—Aug. 4, by Bd. Educ., C. I. Cotton pres., 2 story, basement, 65 x 120 ft., white brick, shops in basement, Junior and Senior High School, Woodmont St. $185,000. P. R. L. Hogner, Smithfield Bldg., Pittsburgh, archt.

CONTRACTS AWARDED

Conn., New Haven—Yale University, constructing 6 units of dormitory group to Marc Eidlitz & Sons, Inc., 100 East 42nd St., New York.

Ill., Maywood—Bd. Educ., general contract 2 story, basement, school addition, to Buckholz, Haff & Schwebl, Lombard. $250,000. Noted May 21.

Ind., Chesterton—School Comrs. Porter Co., brick, steel township school, to Foster Lumber & Coal Co., Valparaiso. Est. $150,000.

Ind., Michigan City—School Comrs. Park Elementary School, general contract 2 story, basement, brick, steel high school addition, to L. Johnson, Michigan City, heating and plumbing, to Simpson & Adamson, Michigan City. Est. $150,000. Noted Apr. 9.

Me., Farmington—Town, Building Comn., 2 story, basement, brick, stone school, plain found., to E. F. Maxim Co., 518 Main St., Lewiston. Est. $150,000. Noted July 9.

Md., Baltimore—Bd. Awards, 2 story, 60 x 2? ft., brick, granite, concrete, structural steel, hollow tile school addition, Washington Blvd., to C. L. Stockhausen Co., Gay and Water Sts., $63,949. Noted July 2 Daily.

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Mass., Fall River — Blessed Sacred Roman Catholic Church, O. Boucher, pastor, 2 story, basement, brick parochial school, plain found., South Main St., to F. Roy, West Hill Ave., South Somerset. Est. $150,000 or more.

Mass., Kingston—St. Francis Xavier Mission, Island Creek, found. for 3 story, basement, 65 x 105 ft., brick, concrete boarding school, to J. Maliguti & Sons, Liberty St., Plymouth. Total est. $155,000. Noted July 2.

Mass., Mansfield—Town, C. L. Hill, chn. building comnr., taking bids altering and constructing 2 story, basement, brick, addition to Junior High School plan found., South Main St. $150,000. L. Clough, 80 Boylston St., Boston, engr. Noted July 9.

Mass., Wellesley—Town, School Building Com., 2 story, basement, brick school, plain found., Fells Sect., to E. T. Madden & Son, 17 Allan Rd. Est. $150,000.

Minn., Worthington—Bd. Educ., M. C. Leonard, clk., general contract constructing 2 story, basement, new school and 2 story, basement, school addition, both rein.-con., brick, Bedford stone, trim, steam heating, to C. H. Peterson & Co., 1036 Builders Exch. Bldg., Minneapolis. $141,880. Noted June 11.

N. H., Durham—State, University of New Hampshire, E. M. Lewis, 2 story, basement, brick, steel, infirmary and rest house, plain found., to Davison & Swanberg, 37 Amherst St., Manchester Est. $150,000. Noted July 16.

N. J., Bergenfield—Bd. Educ., Harding School, Washington Ave., general contract 2 and 3 story, basement, brick, steel, to F. W. Bogert, Huyler St., Hackensack; plumbing, to D. McGrath Co., 185 Moore St., Hackensack, heating and ventilating, to Zabransky Bros., 19 Picken St., Little Ferry; electrical work, to W. Kinzley, 21 Mercer St., Hackensack; steel and iron, to Selback-Meyers Co., 601 22nd St., West New York. Est. $155,000. Noted June 25.

N. J., Long Branch—Bd. Educ., Long Branch, general contract 2 story, basement, brick, steel addition, to James Sutherland, Inc., 222 Main St., Asbury Park; plumbing, to P. J. Eager, Inc., 28 2nd Ave., Long Branch; heating, to W. F. Conklin, 310 Slocum Pl.; electrical work, to Edwards Electrical Shop, 579 Bway. Est. $150,000. Noted June 18.

N. Y., Plattsburg—State Bd. Educ., Albany, general contract normal school, to T. C. Brown, 307 Union St., Schenectady, $115,644; electrical work, to Langdon & Hughes, 246 Elizabeth St., Utica, $8,500.

N. Y., Rochester—Bd. Educ., masonry and carpentry work for Charlotte High School, to J. B. Pike & Son, Inc., 1 Circle St., $789,667; structural steel work, to Leach Steel Corp., 80 Steel St., $108,445; tiling, to Western Tile Co., Rochester, $58,450. Grand total $956,562.

O., Dayton—Bd. Educ., C. J. Schmidt, clk., Ludlow Bldg., 3 story, basement, brick, rein.-con. school, plain found., to Industrial Building Co., Reibold Bldg., $198,000. Noted June 25.

Pa., Springdale—Bd. Educ., B. D. Remaley, secy., 511 Roslyn Ave., 2 story, basement, 112 x 210 ft., brick, steel, stone, terra cotta, high school, to M. J. Steffen, Natrona. Est. $150,000. Noted July 9.

R. I., Cranston (mail Providence)—City, A. Fenner, High School, 2 story, basement, brick, stone school, plain found., Gardner St., to J. W. Bishop Co., Turks Head Bldg., Providence. Est. $150,000. Former contract to Lavigne Co., rescinded.

Ore., Forest Grove—Bd. Educ., 2½ story, basement, brick, rein.-con. high school, incl. gymnasium, auditorium, School Park, to J. F. Lyons, Forest Grove. Est. $150,000.

Ont., Kingston—Sisters of Charity and House of Providence, Ordnance St., 2 story, brick, stone novitiate building, to Angus Robertson (Ontario), Ltd., 159 Bay St., Toronto. Est. $225,000.

Ont., Toronto — Bd. Educ., University of Toronto, Queens Park, 3 story, basement, brick, concrete, steel, stone, marble addition to College of Education, to Redfern Constr. Co., 45 Front St. W. Est. $200,000. Noted May 14.

Que., Montreal—Protestant Bd. School Comrs., Belmont St., 70 x 246 ft., steel, stone, brick school, Iona St., to Shearer Constr. Co., 1400 Shearer St., $207,000.

THEATRES

PROPOSED WORK

N. J., Englewood—Corporation, c/o C. M. Taylor, mgr., Englewood Theatre, 48 East Palisade Ave., bids about Sept. 1, general contract, 2 story, basement, brick, steel, rein.-con. theatre, 2,000 seating capacity, 16 West Palisade Ave. $150,000. Noted July 23.

CONTRACTS AWARDED

Calif., Los Angeles—West Side Land Co., 4322 Crenshaw Blvd., 2 story, tower, 144 x 158 ft. theatre, store, Wilshire Blvd. and Mansfield St., to Lindgren & Swinnerton, 523 West 6th St., $200,000.

Calif., Richmond — United Artists of California, 1966 South Vermont St., Los Angeles rein.-con. theatre, to Beller Constr. Co., 6513 Hollywood Blvd., Los Angeles, $150,000.

Calif., San Jose — N. M. Parrott, San Jose, Class A rein.-con. theatre, to Barrett & Hilp, 918 Harrison St., San Francisco, $150,000. United Artists Corp., 1966 South Vermont St., Los Angeles, lessee. Noted May 14.

Ont., St. Thomas—H. G. Duerr, archt., Lumsden Bldg., Toronto, general contract 2 story, basement, 58 and 68 ft. wide, x 168 ft. long theatre, store to A. H. Thomas & Son Ltd., 45 Dickson St., Galt; electrical work, to A. J. McPherson, c/o General Contractor; plumbing and heating to Bennett & Wright, 286 King St., London; steel deck roofing to Truscon Steel Co. of Canada Ltd., Walker Rd., Walkerville, for Famous Players Canadian Corp. Ltd., Royal Bank Bldg., Toronto. Est. $150,000. Noted May 21.

BANKS

BIDS ASKED

Tex., Tyler—Peoples Natl. Bank, c/o S. R. Greer, pres., takes bids about Aug. 15, 10 or 15 story, 60 x 120 ft., rein.-con., brick, stone, bank and office, West corner of Square. $500,000. A. C. Finn, Bankers Mortgage Bldg., Houston, archt. Noted July 23.

OFFICES

PROPOSED WORK

D. C., Wash.—Owner, c/o A. J. Sauer & Co., archts., 1501 Race St., Phila., Pa., soon takes bids 12 story, basement, 50 x 254 ft., rein.-con. medical arts building, Connecticut Ave. and 10th St.

N. J., Newark—Voorhees, Gmelin & Walker, archts., 101 Park Ave., New York, soon lets general contract 2 story, basement, 80 x 105 ft., central office building, 240 Lyons Ave., for New Jersey Bell Telephone Co., 540 Broad St. Est. $150,000. Noted Dec. 18.

CONTRACTS AWARDED

Mass., Weymouth — American Agricultural Chemical Co., 420 Lexington Ave., New York, altering and constructing 2 story, basement, brick office addition, Fort Point, to Clark & Smith, 1372 Hancock St., Quincy. $150,000.

STORES

PROPOSED WORK

Pa., Pittsburgh—Richman Bros. Co., 1600 East 55th St., Cleveland, O., plans by R. M. Trimble, Commonwealth Building Annex, 5 story, basement, irregular sized, brick, steel store, 223 5th Ave. $250,000. Architects now taking bids wrecking present building.

Wis., Madison — Owner plans department store, $150,000. W. T. Grant, 1441 Bway., New York, lessee.

BIDS ASKED

N. J., Long Branch—H. B. Seymour, archt., 512 McClellan Ave., bids about Sept. 15, general contract 2 story, basement, brick, steel store, apartment, Ocean Ave., for Peter Realty Corp. $150,000. Noted Apr. 9.

CONTRACTS AWARDED

Calif., San Mateo—Levy Bros., general contract 1 story, basement, frame, stucco department store, to Lengfeld & Olund, 145 North El Camino Real, $125,000.

Mass., Northampton — H. I. Shackly, c/o Krokyn & Browne, archts., 120 Milk St., Boston, 1 story, basement, 125 x 135 ft., brick, stone store, to Shawmut Constr. Co., 294 Washington St., Boston. Est. $150,000. Noted July 9.

N. J., Newark—F. Schlather, 1029 South Orange Ave., getneral contract 1 story, basement, brick, steel 1031 South Orange Ave., to Reynolds Constr. Co., 93 Halsey St. Est. $150,000. F. W. Woolworth Co., 661 Broad St., lessee. Noted July 9.

Pa., Phila.—Gimbel Bros., 9th and Market Sts., altering department store, 8th and Market Sts., to Thompson Starrett Co., 250 Park Ave., New York. Est. $100,600.

PUBLIC

PROPOSED WORK

Ind., Crawfordsville—CITY HALL—City plans by C. O. Beeson, Ben Hur Bldg., 2 story, basement, rein.-con., stone, Pike and Water Sts. $150,000.

Ind., Indianapolis—LIBRARY and HISTORICAL—Indiana State Library Building Comn., A. R. Baxter, pres., receiving competitive plans until Oct. 5, Indiana limestone library and historical building. $1,000,000. Address A. Bohn, 610 Indiana Trust Bldg.

Mich., Kalamazoo—JAIL and COUNTY BUILDINGS—Bd. Comrs. Kalamazoo Co., plans by LeRoy & Newlander, Kalamazoo, rein.-con., brick, steel jail and county buildings, plain founds. $250,000.

N. J., Hackensack—CITY HALL—Hackensack Impvt. Comn., City Hall, 2 story, basement, brick, steel, rein.-con., 1st St. $150,000. **Maturity in 1932.** Architect not appointed.

N. Y., New York—JAIL—City office of Boro President, Bronx, sketches by M. Hausle and J. E. Freedlander, 681 5th Ave., 8 story, 43 x 248 ft. jail, River Ave. and 151st St. $700,000.

BIDS ASKED

N. Y., New York—COURT HOUSE—Aug. 14, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., Bronx County Court House, Walton and Mott Aves., East 158th and 161st Sts. Noted July 9.

Public (Continued)

CONTRACTS AWARDED

Calif., Beverly Hills—CITY HALL—City, general contract 3 story, rein.-con., to Baruch Corp., 1015 Lincoln Bldg., Los Angeles, $258,437. Noted July 9.

O., Cleveland—DETENTION HOME—Juvenile Courts Building Comn., J. H. Harris, chn., Court House, detention and juvenile courts buildings, each 3 story, Indiana limestone, steel and concrete, to G. L. Hunting Co., Guarantee Title Bldg., $669,700. Noted June 18.

N. Y., Walkill—PRISON—Commissioner Correction, State Office Bldg., Albany, general contract medium security prison, to Wark Co., 1608 Walnut St., Phila., Pa., $812,000; heating, to J. H. Cooney, 210 North 4th St., Harrison, N. J., $90,866; sanitary work, to J. D. Duffy, 342 Madison Ave., New York, $54,000; electrical work, to Westchester Electric Equipment Co., 73 South Bway., Yonkers, $40,950; refrigeration, to Artic Eng. Co., 123 White St., New York, $8,549. Grand total $1,006,375. Noted June 4.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—LAYMANS RETREAT—Loyola Retreat Assn., plans by R. Montgomery, 572 Chamber of Commerce Bldg., 3 story, basement, frame and stucco masters home, 100 seating capacity, rein.-con. chapel, Sunset Blvd. $150,000.

Conn., Bristol—EXCHANGE—D. Orr, archt., 956 Chapel St., New Haven, soon lets contract 2 story, basement, 80 x 115 ft., brick, steel, stone, Main St., for Southern New England Telephone Co., T. H. Bradley, 157 Church St., New Haven, $150,000. Noted Oct. 9.

N. Y., Saratoga Springs—BATHS, etc.—Saratoga Springs Comn., baths, spa, remodeling bath and drinking hall, $2,500,000. **Maturity about Dec. 1.** J. H. Freedlander, 681 5th Ave., New York, archt. Noted June 2.

CONTRACTS AWARDED

Ill., Chicago — WORLDS FAIR — Chicago Worlds Fair 1933, R. Dawes, pres., 160 North La Salle St., 5th unit, incl. electrical group worlds fair buildings, one devoted to radios, one to communications, other to power generation, distribution and utilization, on Northerly Island in Grant Park, to W. E. O'Neil Constr. Co., 308 West Washington St. Est. $2,000,000. Noted Apr. 2.

Ill., Winnetka — COMMUNITY HOUSE — Hamilton, Fellows & Nedved 814 Tower Court, Chicago, general contract 2 story, brick, stone, Lincoln St., to McKeown Bros., 209 West Jackson Blvd., Chicago; plumbing, to Noble & Thumm, 1065 Addison St., Chicago; heating, to C. W. Johnson, Inc., 211 North Des Plaines St., Chicago; electrical work, to Kordick Electric Co., Winnetka. Est. $165,000.

Mass., Worcester—ART MUSEUM—Worcester Art Museum, F. H. Dewey Sr., pres., 3 story, basement, 110 x 150 ft., brick, stone, to E. J. Cross, 82 Foster St. Est. exceeds $150,000. Noted May 14.

Ont., Toronto—MOTOR COACH TERMINAL—Toronto Transportation Comn., 35 Yonge St., general contract 1 and 2 story basement, 80 x 100 ft. and 96 x 100 ft., stone, brick, tile, steel, to Anglin-Norcross Ltd., Temple Bldg. Est. $250,000.

FACTORIES AND MILLS

PROPOSED WORK

Colo., Salida—MILL—Travertine Co., c/o J. H. Haynes, Salida, and John A. Taft, 162 North Franklin St., Chicago, Ill., mill. $1,000,000.

Ill., Clearing (sta. Chicago) — FACTORY — Clearing Industrial Dist., 38 South Dearborn St., Chicago, owners and contractors, will build 2 story 135,000 sq.ft. floor space, steel truss, cast stone factory, incl. heating plant, offices, laboratories, cafeteria, hospital, 6901-23 West 65th St. Est. $500,000. Pepsodent Co., 919 North Michigan Ave., Chicago, lessee.

N. J., Carteret — CHEMICAL PLANT — Warner Chemical Co., rebuilding 2 story, basement, brick, steel, Roosevelt Ave. $40,000. **Maturity probably soon.** Architect not appointed.

N. J., Edgewater—FACTORY—Lever Bros., 164 Bway., Cambridge, Mass., plans by Stone & Webster, engrs. and archts., 210 Bway., New York, remodeling 4 story factory. **Maturity after Aug. 15.** Noted May 28.

N. J., Wallington — BAKERY PLANT — J. Boruta, 103 Halstead St., 2 story, basement, brick, steel, bakery plant, store and garage, Wallington Ave. and Mercer St. $40,000. J. T. Camlet, 26 Piaget Ave., Clifton, archt. Bids in Project in abeyance. Noted July 9.

Nev., Reno—FACTORY—Parker Brick Co., E. E. Roberts, vice pres., brick, tile clay manufacturing plant. To exceed $40,000.

N. Y., Brooklyn — LAUNDRY — Brighton Laundry Co., West 6th St. and Sheepshead Bay Rd., will award general contract about Aug. 1, laundry, $40,000. J. M. Fenichel, 468 4th Ave., New York, archt.

Pa., Curwensville — HOSIERY MILL — Curwensville Hosiery Mill, Curwensville, C. A. Stevens, pres., Reading, 1 story, 108 x 156 ft., brick, steel mill.

Pa., Indiana — GLASS PLANT — Diamond Glassware Co., H. W. Thomas, mgr., rebuilding glass plant, recently destroyed by fire.

Ont., Kitchener—BOTTLING PLANT—Norton Drinx Co., King St., E., C. H. Norton, plans 2 story, brick, 50 x 100 ft., bottling plant.

Que., Three Rivers—PLANT—Canadian Industries Ltd., Hamilton, A. B. Purvis pres. and managing dir., new cellophane manufacturing plant. $1,500,000.

BIDS ASKED

Pa., Altoona — DAIRY — McCormick Co., archts., 121-27 South Negley Ave., Pittsburgh, taking bids 2 story, 75 x 100 ft., brick, concrete, 406 24th St., for J. E. Harshberger, 406 24th St., $50,000.

Pa., McKees Rocks—PAINT FACTORY—Lake & Davidson, archts., Negley Bldg., Pittsburgh, taking bids 1 story, 60 x 100 ft., brick, steel concrete block, slab roof, concrete floors, Island Ave., for Hackmeister Lind Co., Island Ave.

CONTRACTS AWARDED

Conn., Niantic—LAUNDRY, etc.—Bd. Directors, Connecticut State Farm for Women, c/o State Comptroller, State House, Hartford, brick, concrete, laundry canning plant, storage, root cellar and sun porch additions to N. Corsino, 52 Eaton St., Hartford, $49,753. Noted June 25.

Ind., Evansville—BAKERY PLANT—O. G. Reising, 2339 West Franklin St., general contract brick, steel, aluminum sash, 2339 West Franklin St., to F. Thrash, 813 Covert Ave. Est. $40,000.

Ind., Evansville—DAIRY—Gold Metal Dairy Co., Division and Garvin Sts., general contract, brick, steel, Division and Garvin Sts., to Luhring Lumber Co., 1 North Morton Ave. Est. $40,000.

Ind., Indianapolis—BAKERY — Gutzwiller Bros., 1242 Madison Ave., general contract 40 x 140 ft., brick, steel, steel sash, to C. Prader, 530 Sanders St. Est. $40,000.

Mass., Jamaica Plain (sta. Boston) — LAUNDRY—R. A. Skoagland, 34 Elm St., 1 story, irregular sized, concrete block, steel, concrete found., to John MacDonald Constr. Co., 250 Stuart St., Boston. Est. $40,000. Former contract rescinded. Noted June 25, under "Contracts Awarded."

Mich., Ann Arbor—PRESS BUILDING—University of Michigan, Ann Arbor, 2 story, basement, 50 x 165 ft., brick, concrete, steel and stone press building, plain found., Maynard St., to Lovering & Longbotham Co., Ann Arbor. Est. exceeds $150,000.

N. J., Glassboro—FACTORY—Repp Orchards Products Co., 3 story, basement, 70 x 130 ft., and 1 story, basement, 75 x 100 ft., to Industrial Constr. Co., Broad and Alleghany Sts., Phila., Pa. Noted July 16.

N. J., Hoboken—BAKING PLANT—Continental Baking Co. Inc., 14th St., general contract altering 4 story, basement, brick, steel addition, to White Constr. Co., 95 Madison Ave., New York. Est. $40,000. Noted June 4.

N. J., Newark—LAUNDRY—Amer. Realty Co., c/o Myers & Shanley, archts., 24 Walnut St., general contract altering and constructing 2 story, basement, brick, steel addition, Clifton St., to H. M. Dorenus & Co., 79 Orange St. Est. $40,000. New Jersey Title & Realty Co., 24 Commerce St., lessee. Noted July 16.

N. J., Newark—FACTORY—Health Products Co., 113 North 13th St., general contract altering and constructing 2 story, basement addition, to Eustice Bros., 111 Academy St. Est. $40,000. Noted June 4.

Pa., Carnegie—ROLL STORAGE BUILDING—Braziell & Anderson, archts., 309 4th Ave., Pittsburgh, 1 story, 80 x 180 ft., concrete block, steel, asbestos covering, Robinson Twp., to A. A. Lane Constr. Co., 1869 East 55th St., Cleveland, O., for Superior Paper Products Co., Carnegie, C. J. Bausmann, pres. Noted July 9.

Tex., Amarillo—BAKERY—Grant Bakery Co., c/o J. Grant, Tulsa, Okla., 2 story, 70 x 140 ft., brick, tile, stucco, rein.-con. wholesale bakery plant, plain found., to C. J. Patterson Corp., 4050 Penn St., Kansas City, Mo., $40,000.

Tex., Longview—SKIMMING PLANT—Bell Oil & Gas Co., and Danziger Oil & Refinery Co., 905 Kennedy Bldg., Tulsa, Okla., still, condensers other equipment for skimming plant. 1½ mi. south of here, to Southwestern Eng. Corp., Mayo Bldg., Tulsa, Okla.

Ont., London — FACTORY — Kellogg Co. of Canada (main office at battle creek, Mich.), 3 story, 60 x 80 ft., rein.-con. addition, to Putherbough Constr. Co., Bank of Toronto Bldg. Est. $50,000. Noted July 16.

POWER PLANTS

PROPOSED WORK

Ark., Hot Springs—Arkansas Power & Light Co., c/o C. J. Griffith, vice pres., Little Rock, preliminary plans hydro-electric dam, power plant on Ouachita River, 24 mi. above Carpenter Dam near here. $10,000,000.

Me., West Pownal—State School for Feeble Minded, P. E. Vosburgh, supt., plans by Coombs & Harriman, 11 Lisbon St., Lewiston, brick power plant and laundry addition. $40,000. Noted Feb. 26.

Mass., North Wilbraham—Collins Mfg. Co., 56 Suffolk St., Holyoke, plans by McClintock & Craig, 458 Bridge St., Springfield, 1 story, brick, concrete power plant, Main St. $250,000.

Vt., Northfield—University of Norwich, C. A. Plumley, pres., plans brick, heating plant addition. $50,000. Architect not appointed.

BIDS ASKED

N. Y., Buffalo—Aug. 13, by Adjutant General at state capitol, Albany, replacing boilers, repairing heating system, at 174th Infantry Armory.

N. Y., Geneseo—Aug. 18, by Commissioner Educ., Education Bldg., Albany, construction and heating work for boiler service and service connections, New York State Normal School.

N. Y., New York—Aug. 6, by Dpt. Hospitals, J. G. W. Greeff, comr. Municipal Bldg., general contract, brick, stack boilers and equipment for altering and boiler house additions, City Home, Welfare Island. W. H. Gompert, and K. M. Murchison, 101 Park Ave., New York, archts. Noted May 21.

GARAGES

PROPOSED WORK

Ill., Chicago—Sears, Roebuck & Co., Arlington and Homan Sts., sketches service garage at parking station, Arlington St. $60,000.

N. J., Montclair—White Motor Sales Corp., 640 Bloomfield Ave., service garage, Grove St. and Glenridge Ave. $40,000. Project abandoned. Lewis & Leonard, 51 East 42nd St., New York, archts. Noted Feb. 6, 1930.

N. J., Newark—J. Gennet, 251 Hillside Ave., 1 story, basement, brick, steel auto laundry, 257 Elizabeth Ave. $40,000. **Maturity probably in September.** Acme Auto Laundry, 259 Elizabeth Ave., lessee. Noted July 2.

N. Y., New York—W. Tatt, 348 West 27th St., bids in fall or later, general contract, 4 story service garage, 348 West 27th St. 100,000 W. Sharp, 222 East 17th St., archt. Noted June 25.

N. Y., New York—J. F. McGowan, 1180 Randall Ave., sketches, 150 x 200 ft., service garage Leggett Ave. and Barry St. $40,000. Private plans.

N. Y., New York—A. Montelcone, 2952 Park Ave., sketches by M. W. Del Gaudio, 545 5th Ave., 1 story, service garage, 152nd St. and Park Ave. $40,000.

N. Y., West New Brighton—Tompkins Bus Corp., M. Gordon, in charge, 735 Richmond Rd., St. George, will not build 2 story, basement, brick, steel garage, Castleton Ave. $150,000. Project abandoned. Noted June 25.

BIDS ASKED

Mass., Salem—See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Indianapolis—State Hy. Dpt., general contract 3 story, 109 x 200 ft., rein.-con., brick garage, to Mead Constr. Co., 1027 Lemcke Bldg.; plumbing, to Strong Bros., 309 North Alabama St.; heating, to Freyn Bros., 1028 North Illinois St.; electrical work, to Porter-Glore-Glass, 215 Hudson St. Est. $150,000. Noted July 9.

Mass., Cambridge—Harvard Sq. Garage, altering and constructing 1 story, brick, concrete, steel, garage addition, plain found., Boylston and Mt. Auburn Sts., to S. C. Sperry Co., 238 Main St. Est. $50,000.

Mass., Malden—M. Ingraham, 891 Purchase St., New Bedford, 1 story, concrete filling station, garage and restaurant, 680 Morton St., to Boyer Constr. Co., 60 State St., Boston.

Mass., Salem—Estate of M. M. Creelon, 428 Essex St., 1 story, concrete, steel garage addition, plain found., day labor, $40,000. Andrews, Jones, Biscoe & Whitmore, 50 Congress St., Boston, archts. Noted July 9.

N. Y., New York—Rockwells Bakery, Inc., 328 East 75th St., altering 100 x 125 ft. factory into service garage, 439 East 75th St., to W. Weinstein, 439 East 75th St. Est. $40,000. Noted June 25.

Pa., Sharon—Standard Oil Company of Pennsylvania, Peoples Gas Bldg., Pittsburgh, 1 story, brick, steel, concrete bulk plant, to Dresser Co., The Arcade, Cleveland, O. Est. $40,000.

WAREHOUSES

PROPOSED WORK

N. J., Bayonne—Bush Terminal, I. T. Bush pres., Bush Terminal, Brooklyn, N. Y., rein.-con. shipping terminal, Greenville to Constable Hook, $1,000,000. **Maturity after January.** Noted June 11.

N. Y., New York—M. Levinstien, 665 Hunts Point Ave., plans by S. F. Oppenheimer, 55 West 42nd St., 1 story, storage, garage and factory, Hunts Point and Bryant Aves. $40,000 incl. equipment.

N. J., Weehawken — Bonanno Weehawken Warehouse Co., 1827 Bergen Turnpike, will not build 5 story, basement, brick, rein.-con. warehouse, Park Ave. and 19th St. Project abandoned. Noted Feb. 12.

BIDS ASKED

N. Y., New York—A. Farber, archt., 16 Court St., Brooklyn, taking bids general contract 3 story, basement storage, furniture showrooms, Grand St., for Grand Allen Holding Corp., 16 Court St. $50,000. Noted July 16.

CONTRACTS AWARDED

Ill., Monsanto—Monsanto Chemical Wks., 1721 South 2nd St., St. Louis, Mo., 1 story, 92 x 171 ft., rein.-con., brick, structural steel, tile warehouse, and alterations to present building, to Woermann Constr. Co., 3800 West Pine St., St. Louis, Mo. Est. $100,000.

Neb., Lincoln—Union Terminal Warehouse, c/o C. Stuart, 1040 Crestdale Rd., 3 story, basement, 150 x 380 ft. rein.-con., brick, stone, warehouse, W. St., between 16th and 17th Sts., to Olson Constr. Co., Stuart Bldg. Est. $350,000.

N. C., Greenville—Smith & Sugg, warehouse, to D. J. Rose & Son, Rocky Mount, $16,588.

Pa., Sharon—Standard Oil Co. of Pennsylvania, W. E. Black, in charge, Peoples Gas Bldg., Pittsburgh, 1 story, 30 x 80 ft. metal warehouse, 1 story, 32 x 54 ft. rein.-con., tile garage, 1 story, 14 x 20 ft. metal pump house, Tanner St. and Nickel Plate R.R., to Dresser Co., Arcade Bldg., Cleveland, O.

See proposal advertising on page 61

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